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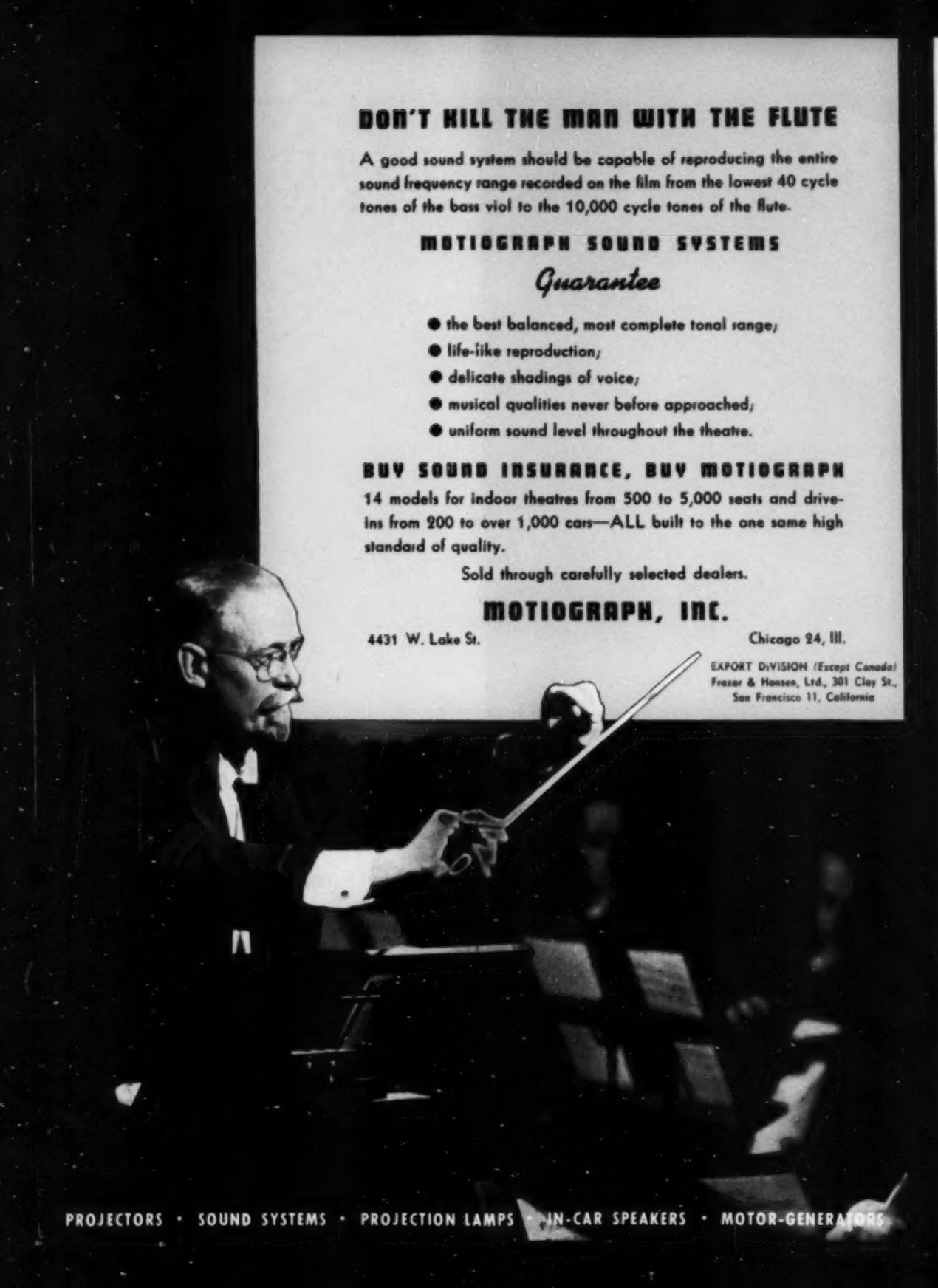

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AARON NADELL, *Editor*

Volume 27 SEPTEMBER 1952 *Number* 9

Index and Monthly Chat 3

Heart of the Projector Mechanism, III 5
ROBERT A. MITCHELL

Stereosound Enhances Eidophor Tv 11

British Plan Four-Year Course in Projection 12

New Strong Slide Projector Uses AC Arc 14

Electrical Indicating Instruments 15
C. C. PETERSEN

Theatre Television Progress 17
NATHAN L. HALPERN

In the Spotlight 18

American Labor Movement, II 20

New Aluminum Gimmick for Handling Hot Carbons 21
J. G. JACKSON

IA Locals Active in 16-mm Work 22

How to Book 16-mm Prints 23

Accepted Standards for 16-mm Projection, III 24

Letters to the Editor 26

TESMA Show Bookings Boom 28

News Notes

Technical Hints

Miscellaneous Items

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MONTHLY CHAT

AMONG important matters considered by the recent 41st IA Convention at Minneapolis was the government's latest anti-trust suit against leading picture producers and exhibitors. The Convention agreed that this assault by the Department of Justice should be opposed, and by resolution authorized the General Office to take "such action as it may deem necessary and appropriate to cope with the situation."

Thus Labor, carrying its full weight as one of the major partners in the industry, joins with producers and exhibitors in a common cause.

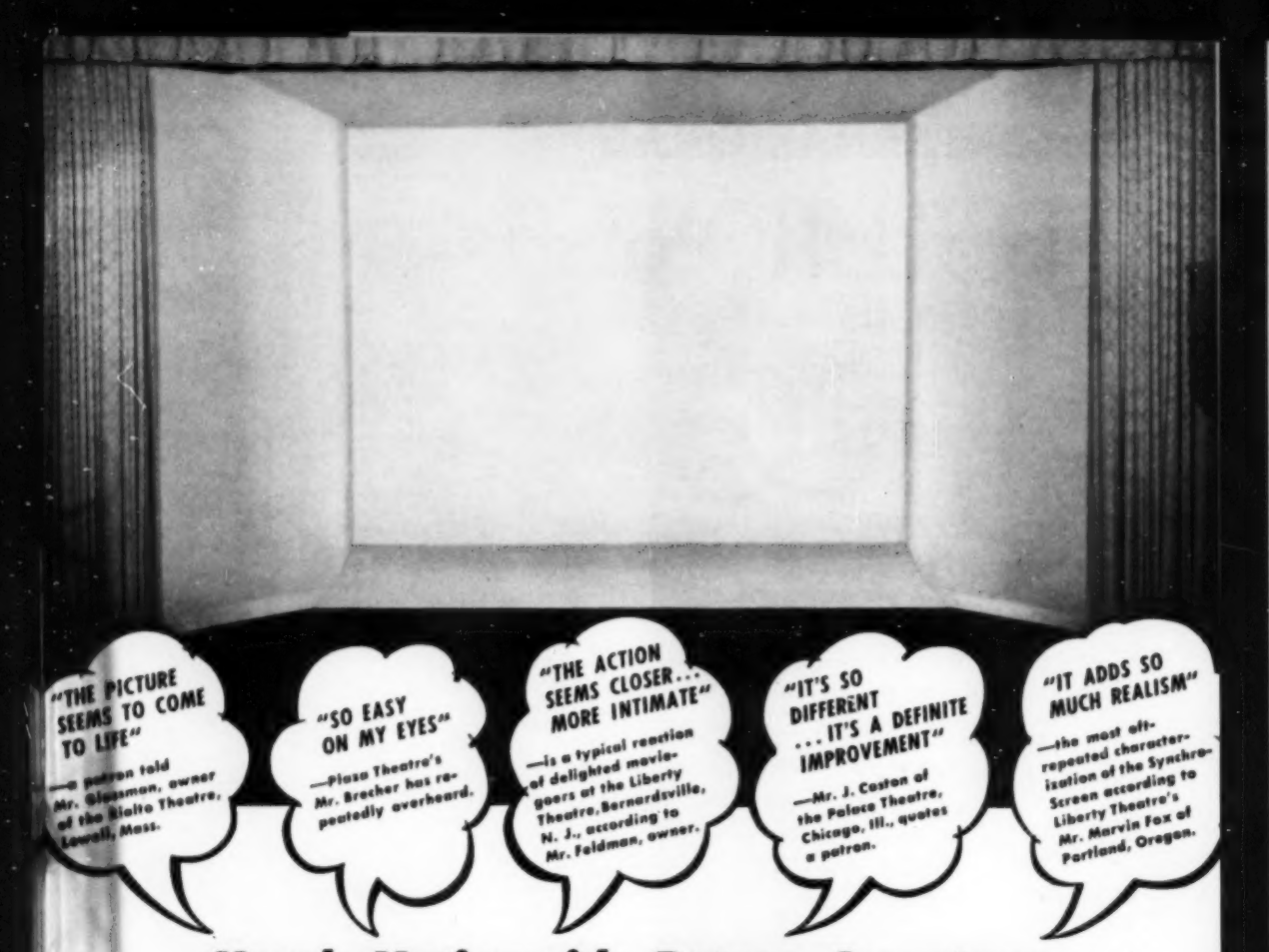
The Justice Department claims that producers are guilty of "restraint of trade" when they limit their willingness to lease 16-mm versions of top features to Tv stations; or to schools, churches, merchants, and others that use movies to attract attendance but have independent means of revenue and therefore show the pictures at low admission or none.

Producer and exhibitor circles are putting up the strongest kind of opposition to this legal action. Many go so far as to assert that if it succeeds it will force all theatres to close. They also point out that Tv and other free or low-price exhibitors of motion pictures cannot possibly repay the cost of making a feature attraction—only theatre-goers can—; that if theatres are forced to close down feature pictures simply will not be made and no one will get them. The daily press in many cities has taken up the fight on behalf of the theatre and against Tv, and has contributed some strong editorial condemnation of the government's action.

The Department of Justice apparently concedes that theatres are entitled to first showing and suitable clearance before 16-mm versions of their stock in trade are shown free or at low price by others, but contends that such clearance must not unreasonably restrain competition in the exhibition of motion pictures, and that up to now such has been the case.

This will be one of those legal tussels in which the learned and honorable judges are going to have to pull the answer out of their hats. No answers can be found in a law that was written when there was no Tv nor 16-mm, and motion pictures were hardly more than a nickelodeon novelty. The judges are asked to decide what Congress intended the law to mean. The plain fact is that Congress didn't intend anything with respect to these matters because two of them had no existence and the third had no importance.

A new Attorney General might, of course, decide to drop the case. If he does not, it will drag through the courts for many a weary year. Whatever the courts may decide, Congress can overrule them if it wants to. And Labor in this industry will do its full share in cooperation with other elements to secure a favorable outcome.


"THE PICTURE SEEMS TO COME TO LIFE"
—a patron told Mr. Glassman, owner of the Rialto Theatre, Lowell, Mass.
"SO EASY ON MY EYES"
—Plaza Theatre's Mr. Brecher has repeatedly overheard.
"THE ACTION SEEMS CLOSER... MORE INTIMATE"
—is a typical reaction of delighted moviegoers at the Liberty Theatre, Bernardsville, N. J., according to Mr. Feldman, owner.
"IT'S SO DIFFERENT ... IT'S A DEFINITE IMPROVEMENT"
—Mr. J. Coston of the Palace Theatre, Chicago, Ill., quotes a patron.
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VOLUME XXVII SEPTEMBER 1952 NUMBER 9

Heart of the Projector Mechanism

PART III

By ROBERT A. MITCHELL

THE advantages of a correctly accelerated and decelerated 5:1 intermittent are obvious when we remember that the shutter is an integral part of the system. The shutter used in conjunction with the conventional 3:1 movement transmits, at most, only one-half of the light, the other half being wasted on its blades. If we narrow the blades to let more light through, we get either travel-ghost or a trembling effect in the image which annoys patrons seated close to the screen. Besides, in order to get a *perceptible* increase in picture brightness, 10 or 15% of the total included angle of the shutterblades must be trimmed off. This is definitely out of the question. For the best quality projection, shutter blades ought to be a trifle too wide instead of a trifle too narrow. In no case should the angular width of each blade be less than 90° when conventional 3:1 geneva intermittents are employed. This blade-width results in a light-transmission of 50%.

5:1 Ratio Movements

If, however, a 5:1 intermittent be used in the projector, we have a choice of two shutter designs, each possessing its own peculiar advantages. Figure 7 illustrates these two shutters (labelled "Brilliant" and "Flickerless") together with the conventional type for 3:1 movements.

Each of the three shutters illustrated is meant to revolve exactly once for each cycle of the intermittent. Thus each shutter will revolve 24 times every second.

The main point to be grasped is that the Brilliant and Flickerless shutters *cannot* be used with ordinary 3:1 intermittents. They are designed for 5:1 intermittents only.

The Brilliant shutter for 5:1 movements is similar to the conventional type except that the blades have been narrowed to an angular width of 60°. The two openings, accordingly, are 120° each, resulting in a light-transmission of slightly more than 66%.

This shutter, although producing exactly the same amount of shutter-flicker as the conventional shutter (48 cycles per second), nevertheless lends itself admirably to drive-ins and other large-screen theatres in which adequate picture-brightness poses a serious problem.

The Flickerless shutter for 5:1 movements, on the other hand, has three 60° blades and three 60° openings. There are thus two balancing cutoff blades instead of one. Although the light-transmission is 50%, the same as that of the conventional shutter, the light-cutoffs occur at the rate of 72, instead of 48, every second. Since 72 cycles per second is a frequency too high to be visible even when the picture is intensely bright, the Flickerless shutter is ideal for medium-size and small theatres having very high levels of screen brightness.

While the pin-cross movement furnishes an excellent 5:1 intermittent having the desired acceleration-deceleration characteristics, other 5:1 intermittents can be devised.

For example, a simple 5:1 geneva movement can be designed. Figure 8 shows the plan of such a movement. Tangential entrance of the cam-pin into the star-wheel slot to avoid bumping before acceleration has properly begun is accomplished by the use of a 3-slotted star. The cam must accordingly be made much larger than the star.

There are two disadvantages inherent in this 5:1 geneva movement, however. The first is the close proximity of the cam-pin to the axis of the star-wheel shaft at the time of greatest pulldown speed. This disadvantage could be overcome by making the cam and star very large; but the size of the movement might prove impractical.

Size of Sprocket

The second disadvantage is the need for a 12-tooth sprocket as the intermittent sprocket. The small size of this sprocket relative to the standard 16-tooth and larger sizes may be seen in Figure 9. With a 12-tooth intermittent sprocket, wear on the sprocket-holes of the film might be excessive. The use of reduction gearing between the star-wheel and the intermittent sprocket in order that a larger sprocket be used does not seem feasible.

So much for a *direct* 5:1 geneva intermittent. Now the ordinary geneva movement can be converted into a 5:1 movement either by the use of levers (Edison's method) or by the use of elliptical gears for periodic acceleration and deceleration of the cam-wheel.

In the latter method, the intermittent flywheel is attached to the shaft of the constant-speed (driving) elliptical gear, and the cam-wheel to the shaft of the variable-speed mating (driven) elliptical gear. In operation the cam revolves most slowly during the middle of the at-rest period of the star and sprocket, and most rapidly during the pulldown period.

This system works very satisfactorily —so well, in fact, that we fail to understand why it has not been adopted by the

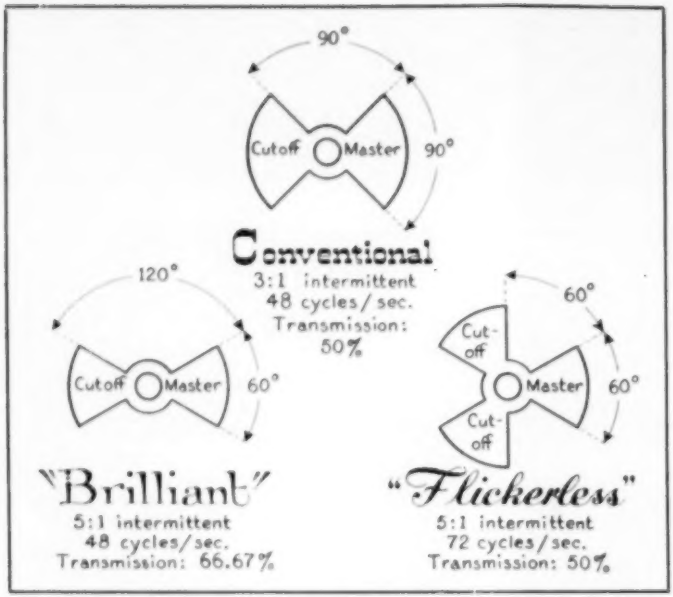

FIG. 7. The two-fold advantage in shutters which can be used with 5-to-1 intermittent movements. The "Brilliant" shutter has the same periodicity as the conventional shutter—48 cycles per second—but transmits much more light to the screen, making the picture brighter. The "Flickerless" shutter transmits the same amount of light as the conventional one, but its high frequency—72 cycles per second—frees pictures projected at high light levels from annoying shutter-flicker evident with intense light at 48 cps.

well-known projector manufacturer who has tested it exhaustively.

A fourth type of 5:1 intermittent, shown in Figure 10, is the "screw-shift" movement—also called the "variable ratio" movement because the ratio can be changed by merely changing the flange-wheel to one having the same diameter but a different plowshare pitch. It is manufactured by Lytax in Germany. The size of the intermittent sprocket is governed solely by the number of radial slots in the slot-wheel.

The plowshare protuberance brings about the pull-down shift of the intermittent sprocket. Consider the flywheel in Figure 10 to revolve in a clockwise direction as viewed from the top. The flange slides through one of the slot-wheel slots to hold the intermittent sprocket at rest most of the time. But when the plowshare-screw comes along, the slot-wheel and sprocket begin to move, rapidly accelerating until the plowshare is halfway through the slot. Movement continues, but at a decelerating rate until the point of the plowshare is in the slot. As the plowshare disengages, the flange enters the next slot, locking slot-wheel and sprocket.

A friendly argument now substantially settled arose on this side the Atlantic—the battle of the soft *versus* the hardened intermittent sprocket. It was formerly imagined that hardening causes undercutting in the form of a notch in the metal at the base of the sprocket teeth, and that teeth not hardened wear off smoothly. Experience has failed to support these opinions.

As a matter of fact, the teeth of the old-style 0.935-inch in diameter 16-tooth intermittent sprocket got notched at the base whether soft or hardened. It was supposed by some that the hardening did not extend all the way through the teeth. In that case rapid notching might occur after the hardened surface layers of metal had worn off. But the microphotograph of hardened intermittent-sprocket teeth on p. 78 of "The Sound Track Book of the Theatre" (Motiograph, Chicago) proves conclusively that the hardening penetrates the tooth completely.

In the opinion of Motiograph engineers, the hardened steel intermittent sprocket outlasts the soft sprocket many times over, and suffers no undue notching at the base of the teeth. So sure is this opinion, that all Motiograph projectors, including the modern AA, are furnished with hardened intermittent sprockets. Simplex does the same in the E-7 and X-L projectors.

The teeth of new-style 16-tooth intermittent sprockets, 0.943 of an inch in diameter, have a tendency to wear off smoothly, with less notching, than the teeth of the old 0.935-inch sprockets. This characteristic has nothing to do with the hardness of the teeth.

Intermittent Sprockets

In the opinion of some projectionists and manufacturers, the new-style standard sprocket was made too big. Instead of 0.943 inch, they say, the new-size sprocket should be 0.940 of an inch in diameter, since shrunken film—and this includes all film that has been run a few times—does not take kindly to sprockets having too great a tooth-pitch. Alleged "improved" and unimproved prints must still run on the same projector.

The even larger 0.945-inch sprocket recommended in 1930 (American Standard Z22.35) was ultimately rejected because of its noise, rapid wear of the teeth, and damage inflicted on the film perforations. The size of this sprocket made no allowance whatever for film shrinkage—that is, it was suitable only for film-stock having a shrinkage of 0%. Z22.35-1930 has, therefore, been modified, and as Z22.35-1947 now specifies an 0.943-inch sprocket.

Film can lose as much as 1.8% of its length through shrinkage in extreme cases. To accommodate a film shrunk to this extent, an 0.929-inch sprocket is required to avoid sticking of the film to the sprocket teeth, with severe tearing when the sprocket-holes disengage. With present-day stock, however, shrinkage in excess of 1% is rare. For this degree

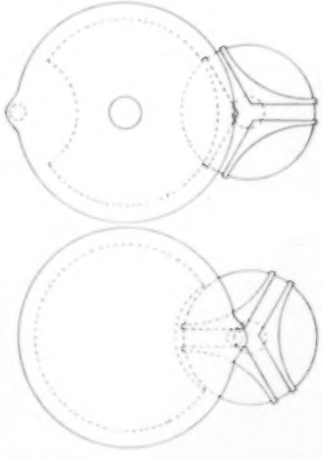

FIG. 8. A geneva type 5-to-1 movement. This intermittent is workable, but has two disadvantages—terrific leverage during pulldown and the necessity for using a small 12-tooth intermittent sprocket which might damage sprocket-holes.

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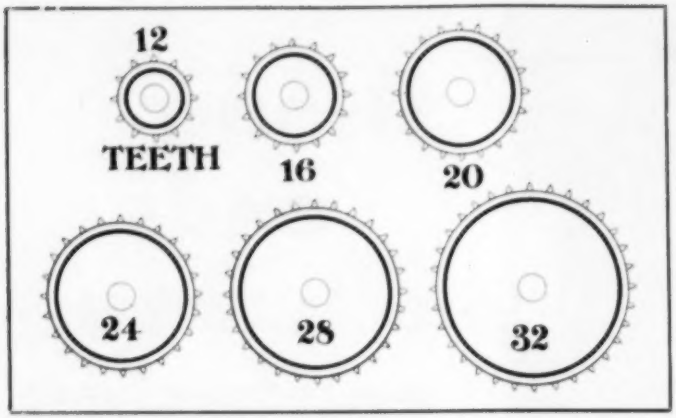

FIG. 9. Comparison of the relative sizes of various 35-mm sprockets. The 16-tooth sprocket is now standard for intermittents, and is also commonly used as a feed and sound sprocket in most American equipment. The 24-tooth sprocket is used for upper and lower feeds in the Simplex X-L. The 32-tooth sprocket is common in many soundheads, in motion picture cameras, and as the feed and holdback sprockets in most European projectors.

of shrinkage, an 0.937-inch sprocket meshes perfectly. Time will tell whether triacetate safety stock shrinks more and faster than nitrate stock of good quality, or vice versa.

An 0.940-inch sprocket, however, works perfectly with film shrinkages up to 0.8%, which seems a bit closer to down-to-earth reality than larger sprockets. The old 0.935-inch sprocket accommodated shrinkages up to 1.2%—unnecessary in these days when runs in neighborhood houses are "hotter" than they used to be.

Picture Jump and Gate Tension

Even though film rarely or for long possesses that precise degree of shrinkage which results in perfect mesh of the perforations with the sprocket teeth, the use of 25- and 32-tooth feed and holdback sprockets has demonstrated conclusively that the larger sprockets are kinder to the perforations. A quarter film-wrap on a 16-tooth sprocket brings 4 teeth on each side into play. The same wrap of film on a 24-tooth sprocket brings 6 teeth into play.

Definite advantages may be claimed for the 24-tooth intermittent sprocket. Tests indicate that increased perforation damage is not appreciable below intermittent ratios of 7:1 or 8:1 with 35-mm film running at 90 feet per minute. And whatever increase in wear may occur at high ratios is due, not so much to the rapidity of the pulldowns, as to the increased gate tension needed to prevent overshooting. With ratios of 5:1 or 6:1 gate tension need be set only slightly higher than is customary with 3:1 intermittents.

As previously stated, the parts of all American geneva movements are manufactured to a tolerance of 0.0001 inch. With "perfect" film the picture-jump in the aperture will be less than 0.0005 inch if the intermittent be properly adjusted and gate tension correct. Accordingly, the picture-jump on a screen 20 feet wide will be of the order of $\frac{1}{8}$ inch. This is obviously too small to be detected from even the front rows of seats. If a greater degree of picture-jumping prevails, the trouble may be found in worn or maladjusted mechanism parts, improper gate tension, film-loops too large, loose lens mount, unsteady projector support, or in the film itself. The film is very often at fault.

The work performed by the 3:1 geneva movement is exacting. Working at the rate of 24 frame-pulldowns per second, the complete pulldown is performed in 1/96 of a second. Between pulldowns, the sprocket and film remain at rest for 1/32 of a second. While the *average* speed of the film through the gate is 90 feet per minute, the average speed during the pulldown process is 360 feet per minute.

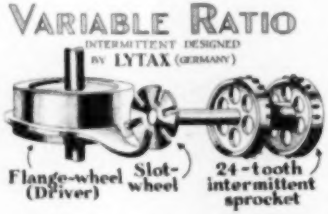

FIG. 10. The screw-shift intermittent, the movement-ratio of which may be varied by changing the plowshare portion of the driving-wheel flange. An eminently satisfactory movement permitting use of 5-to-1 ratio and 24-tooth intermittent sprocket.

Because the film is accelerated and decelerated at increasing rates during the pulldown, the *maximum* film-speed of 860 feet per minute is attained in only 1/192 of a second from the time that the cam-pin enters a star-wheel slot!

And let it not be supposed that film went through the projector more slowly in the days of silent pictures. If the show happened to be running overtime, the projectionist would crank the machine as fast as 120 feet per second, slowing down only during the subtitles so that the audience would have time to read them! (*Normal* silent speed was 16 frames per second, 60 feet of film per minute.)

With these facts in mind, we can easily see that excessive gate tension will cause the sprocket-holes of the film to check and tear, especially at their corners. But if not enough tension is applied, the film will overshoot, making the picture look as though it had been photographed during a violent earthquake. There is absolutely nothing except the slight friction offered by the face of the intermittent sprocket plus gate tension to hold the film in place when the sprocket stops turning.

Our nickelodeon projectionist who cranked his Power's at top speed often had to press against the film with his fingers to prevent overshooting.

Overshooting seldom bothers us today except in the case of "green" (brand-new) prints which have not been properly lacquered or waxed for their first run. Overshooting from this cause may be eliminated by (1) very high gate tension (which may ruin the film); (2) low gate tension (which will minimize the "sticking"), or by (3) lubrication of the edges of the film with projector oil (which may oil-spot the print, and fog the lens with oil vaporized by the heat of the gate). In short, there is no satisfactory method open to the projectionist that will enable him to remedy this oversight on the part of the exchange.

Maintenance of Intermittents

It is impossible to give specific instructions for the care and repair of intermittent movements in an article of this nature because it would be necessary to cover all makes and models—and there are more than a few in use. So instead of doing this, we commend to the projectionist the first-hand information given in manufacturers' manuals. These may be obtained by writing to the manufacturers themselves, asking any special questions which may not be covered in general instruction booklets.

However, a few words may not be out of order anent the changing of intermit-

(*Continued on page 34*)

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OKLAHOMA CITY—Nat'l Theatre Supply Co.; Oklahoma Theatre Supply Co.; The Century Theatre Supply Co.
PHILADELPHIA—Blumberg Bros.; Nat'l Theatre Supply Co.
PITTSBURGH—Atlas Theatre Supply; Nat'l Theatre Supply Co.
SALT LAKE CITY—Inter-Mountain Theatre Supply Co.
SAN FRANCISCO—C. J. Holzmueller; Nat'l Theatre Supply Co.; W. G. Preddey Theatre Supplies.
SEATTLE—B. F. Shearer Co.; Nat'l Theatre Supply Co.
SIOUX FALLS—American Theatre Supply Co.
ST. LOUIS—City Electric Co.; Nat'l Theatre Supply Co.
TAMPA—United Theatre Supply Corp.
TOLEDO—Theatre Equip. Co.
WESTERLY, R. I.—G. H. Payne Motion Picture Service.

IN CANADA

CALGARY, ALTA.—Dominion Sound Equipments, Ltd.; Sharp's Theatre Supplies, Ltd.
EDMONTON, ALTA.—Dominion Sound Equipments, Ltd.
HALIFAX, N. S.—Dominion Sound Equipments, Ltd.
MONTREAL, QUE.—Dominion Sound Equipments, Ltd.; General Theatre Supply Co.; Perkins Electric Co., Ltd.
OTTAWA, ONT.—Dominion Sound Equipments, Ltd.
QUEBEC, QUE.—Dominion Sound Equipments, Ltd.
REGINA, SASK.—Dominion Sound Equipments, Ltd.
ST. JOHN, N. B.—Dominion Sound Equipments, Ltd.; General Theatre Supply Co.
TORONTO, ONT.—Dominion Sound Equipments, Ltd.; General Theatre Supply Co.; Perkins Electric Co., Ltd.
VANCOUVER, B. C.—Dominion Sound Equipments, Ltd.; General Theatre Supply Co.
WINNIPEG, MAN.—Dominion Sound Equipments, Ltd.; General Theatre Supply Co.

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NAME OF SUPPLIER _____

SEE THE NEW STRONG PRODUCTS IN BOOTHS NOS. 150-151 AT THE TESMA SHOW IN CHICAGO (MORRISON HOTEL) NOVEMBER 15-19

Stereosound Enhances Eidophor Tv

EIDOPHOR theatre-size television (IP for July, page 14) is equipped with stereophonic sound, Altec Service Corporation (which cooperated in supplying the equipment) now reveals.

At the Eidophor demonstrations in New York in June the remarkably lifelike quality of sound was apparent to many present, but inquiries on the subject were turned aside by Twentieth Century-Fox officials who naturally wanted to concentrate attention, at that time, on the excellence of the Tv screen image.

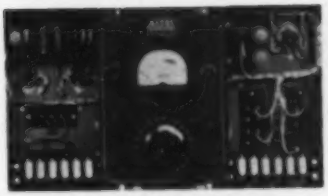
But in fact, as has now been made known, there were three separate sound systems, actuated by three separate sets of microphones and supplying three separate speakers.

Binaural Sound in Small Theatre

A third-dimensional audio impression (as in the original Walt Disney "Fantasia") was not produced, owing to the small physical size of both theatre and studio. The studio offered little room for the players to move about; they were grouped closely together. Further the narrowness of the "Little Theatre" forced the grouping of the three sets of loudspeakers rather close together. For these reasons the effect produced might be described as a binaural rather than a truly three-dimensional output. Binaural sound is, of course, richer and more lifelike than ordinary reproduction because the sounds entering the listener's right and left ear are not identical but vary slightly, as in actual life.

Figure 1 is a schematic presentation of the stereophonic system. It will be noted that there are two separate sets of microphones—three to each set. One reason for this was the L-shaped layout of the studio. The stem of the "L" constituted the stage, with the Tv cameras at the top of the stem. In the base of the "L," off to one side and out of sight of the cameras, were the musicians. Figure 1 diagrams the three microphones that provided stereophonic pickup from the stage, the second set of three that provided stereophonic pickup of the orchestra; and also how the resulting outputs from left stage and left orchestra, center stage and center orchestra, right stage and right orchestra, were mixed and each applied to its appropriate amplifying channel. The resultant audio effect was very much as if the orchestra had been in a pit in front of the stage, and only three microphones used instead of six—but in that event the musicians could not have been so readily hidden from the cameras.

Earl I. Sponable, director of research for Twentieth Century-Fox and G. L. Carrington, president of the Altec companies, planned the stereo sound system several months in advance of the demonstration. Lorin Grignon of the Twentieth Century-Fox West Coast sound department, and F. J. Pfeiff of Altec Service Corporation



Altec-Lansing A 127 amplifiers were among the equipment items supplied by Altec Service Corp. for use with the Eidophor stereophonic sound system.

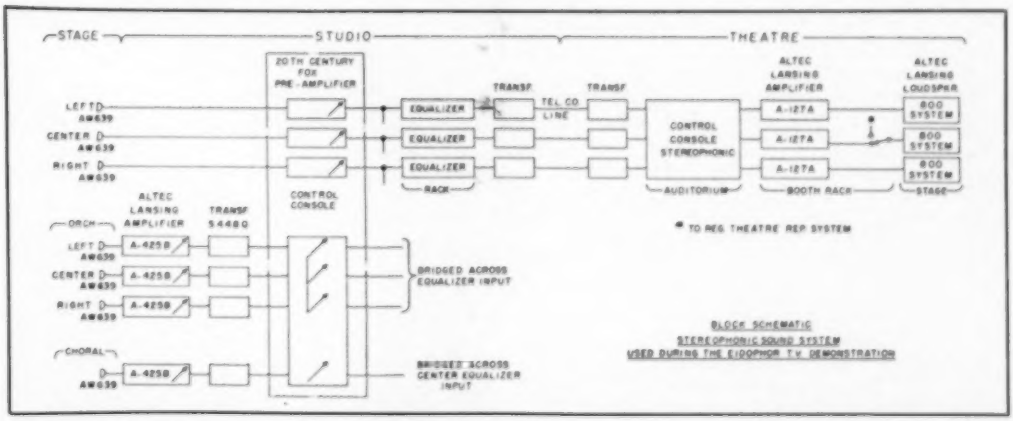
engineering department, cooperated in supervising the installation. Some of the equipment had been built on the West Coast and was of special design for Twentieth Century Fox's experimental stereophonic film recordings. Altec supplied more standard items, including their 639 microphones, 127 and 425 type amplifiers, matching transformers and type 800 speaker systems. Three specially equalized telephone lines provided the three audio channels between the studio and the theatre two city blocks away.

Loudspeaker Locations

A part of one of the three sound channels was the regular sound amplifier of the Fox Little Theatre projection room. This amplifier normally operated into an Altec Voice of the Theatre speaker system; that system was removed in favor of the three Altec 800 systems used in the Eidophor demonstration. The right side and left side 800 speakers were located outside the edges of the screen, concealed behind a masking of thin China silk. The central amplifier channel was equalized to compensate for the difference in sound

(*Continued on page* 33)

FIGURE 1



BLOCK SCHEMATIC
STEREOPHONIC SOUND SYSTEM
USED DURING THE EIDOPHOR TV DEMONSTRATION

At extreme top left of diagram are shown three AW 639 microphones used for stage pickup; three more (below) for orchestra pickup and one (bottom) for the chorus. The three stage microphones are wired to pre-amplifiers located inside the studio control console; the four others to A-425 B pre-amplifiers and thence through S 448 Q transformers to the same console. Outputs are bridged at equalizer inputs to form three transmission circuits. These in turn are wired through telephone lines and matching transformers to the auditorium control console and thence to their respective power amplifiers and loudspeakers. A switch permits ordinary operation through the center speaker only.

British Plan Four-Year Course in Projection

Elaborate apprentice - instruction program and exemption from draft planned to overcome scarcity of trained, competent projectionists.*

A FOUR-YEAR course of apprenticeship and training for projectionists in Great Britain is currently under consideration by exhibitor circles in that country as a means of counteracting the shortage of trained theatre projectionists.

The elaborate training course was not planned by exhibitors, but by the British Kinematograph Society — the overseas equivalent of the American Society of Motion Picture and Television Engineers. BKS worked out the details in collaboration with the government, the Association of Technical Institutes and the Technical Schools Headmasters' Association. (Government enters into the picture because draft deferment of students is planned.)

Two other organizations intimately concerned are the union—NATKE (National Association of Theatrical and Kinema Employes)—and the employer organization — CEA (Cinematograph Exhibitors Association).

At present the proposal is in the hands of CEA for decision. That organization is reported to favor some kind of project to remedy the current shortage of skilled projectionists. It is wary of this proposal, however, for three reasons.

One is fear that licensing of projectionists may result, and CEA is opposed to licensing because that would limit the supply of available labor. Second, CEA is said to fear that highly trained men will want proportionately high pay, and that they will have acquired the education and ability to go elsewhere if they do not get it. Thirdly, there is the chance that this proposal may eventually lead to a closed shop in the projection field. The union, for its part, is not altogether in favor of the proposal either, but objects to any arrangement that might require NATKE to help non-members.

Under the plan, apprentices would divide their time between the projection room and school, but with most of the time being spent in the projection room. They would be paid 30 shillings a week at the start; then 40 shillings (roughly $6.00 at present rates of exchange), and so on to 70 shillings after completing the course.

The syllabus, as proposed, is as follows:

*According to Ideal Kinema, London.

FIRST YEAR

MATHEMATICS

Arithmetic.—Revision of elementary rules: addition, subtraction, multiplication and division of fractions and decimals. Averages: percentages: square and cube roots: metric system: conversion of units.

Mensuration.—Areas and linear measurements of the rectangle, the triangle and the circle.

Algebra.—A general introduction to symbols: substitution: addition and subtraction: simple equations of the first degree: easy factors and fractions: laws of indices.

Graphs.—Plotting and reading of simple graphs.

ELEMENTARY PHYSICS

Heat as a form of energy: difference between temperature and heat: thermometers: Fahrenheit and Centigrade temperature scales: units of heat: expansion and contraction due to changes in temperature. Laws of radiation, propagation and reflection of light: plane mirrors: curved reflectors: condensers: simple lenses: illumination: brightness, reflection factor. Force: work, energy power. Laws of motion: velocity and acceleration.

Treatment of the syllabus should include the appropriate laboratory work.

ELECTRICAL ENGINEERING

Theoretical Work.—Elementary concept of electrical charge and EMF, electrical currents, practical units (ampere, volt and ohm). Ohm's Law: potential fall in circuits: potential difference: series, parallel, and series-parallel circuits. Heating effect of the current and simple applications. Electrical work and power, and relationship of units (joule, watt, horsepower, kw. hr. and BTU).

Elementary magnetism: permanent magnets: electro magnets: force in a conductor carrying current in a magnetic field. Simple forms of galvanometers: ammeters and voltmeters. Chemical effects of the current; primary and secondary cells.

Laboratory Work. — Experiments designed to teach the meaning of electrical units: determination of Ohm's Law, including connection of resistances, cells, etc., to prove values of series, parallel and series-parallel networks.

Examination of primary and secondary cells, including instruction in their connection, use and maintenance. Experiments to illustrate charging and discharging characteristics of cells.

Projection Engineering. — Standard dimensions of films: standard leaders: rewinding: splicing: changeover dots: care of film: spools: film cabinets.

SECOND YEAR

MATHEMATICS

Revision and extension of the first-year work, including properties of the sine wave: elementary treatment of vectors and rates of change. Mathematics should also provide for the further calculations required in electrical engineering and physics.

PHYSICS

Heat—Heat transmission by radiation, conduction and convection: mechanical equivalent of heat. Types of fuel in general use and calorific values. A description of types of boilers, heating systems, and gauges, as used in kinemas.

Light.—Projection lenses: focus: focal length: image formation: aperture: compound lenses: lens faults and correction.

Sound—Wave motion; wavelength:

Nitrate Fire Shows Its Stuff

What nitrate film fire can do was demonstrated late last month in Atlanta, Georgia, when prints stored in the Kay Film Exchange suddenly blazed. Sheets of pure flame burst through closed windows and shot 50 feet across the street, scattering fragments of glass on the heads and shoulders of firemen. A hailstorm of glass splinters from those windows also showered a nearby parking lot. Acrid fumes following the blasts overcame a number of the firefighters. Although the fire was brought under control in less than half an hour extensive damage was done not only to the film exchange but to a number of nearby business enterprises.

Night in day...

The best moonlight is the light of the noonday sun...

Obvious, of course, to an industry trained in modern cinematographic technics. Equally obvious is the need for infinite care in the choice of film and filters—in keying film and situation... in co-ordinating method and result desired in processing.

To help solve problems such as these, representatives of the Eastman Technical Service for Motion Picture Film are trained to advise—are ready and able to roll up their sleeves and lend a hand wherever necessary.

In maintaining this service, the Eastman Kodak Company has branches at strategic centers... invites inquiry on all phases of film use from all members of the industry. Address Motion Picture Film Department, **Eastman Kodak Company**, Rochester 4, N. Y. *East Coast Division*, 342 Madison Avenue, New York 17, N. Y. *Midwest Division*, 137 North Wabash Avenue, Chicago 2, Illinois. *West Coast Division*, 6706 Santa Monica Blvd., Hollywood 38, California.

frequency: amplitude: musical notes, pitch and quality: elementary treatment of microphones and loudspeakers.

ELECTRICAL ENGINEERING

Elementary treatment of and experiments with DC generators and motors, including principal types, construction and control. Further treatment of voltmeters and ammeters (moving coil, moving iron and hot wire) use of multipliers and shunts: the ohmmeter. Types of cable, sizes, capacities: fuses: switchgear and fittings: earthing: simple bell and telephone circuits: symbols: reading of wiring diagrams: testing insulation and continuity. Filament lamps: construction, rating and efficiency. Simple lighting systems and control, including dimmers.

PROJECTION ENGINEERING

Types of film material and cements: making up programmes: film inspection and repair: transmission characteristics: types of sound track: principles of projection: persistence of vision: film path: take-up: fire traps: loops: projection mechanism and drive.

THIRD YEAR

ELECTRICAL ENGINEERING

Elementary concept and experiments to illustrate the principles of alternating voltage and alternating current: frequency: sine wave: mean and RMS values: single-phase supply: simple series and parallel AC circuits with resistances, chokes and condensers: phase displacement, power and power factor, simple polyphase circuits.

Examination of the construction of and the theory of transformers.

Valves (Elementary treatment).—Thermionic emission: the filament: the cathode: saturation: the simple diode: space charge: rectifying action: the triode: grid control: characteristic curves: the tetrode: the pentode: photo-electric cells: valve bases. Ionisation effects in valves.

Rectification (Elementary treatment).—Principles of rectification: the diode rectifier as used for HT supplies: full-wave and half-wave circuits: metal rectifiers: the bridge circuit: mercury vapour rectifiers: hot cathode rectifiers: smoothing circuits.

PROJECTION ENGINEERING

Description of the manufacture of film: principles of photography: positive release prints and treatment: colour film (additive and subtractive). Projection mechanisms: intermittent motion: type of intermittent movements, including detailed examination of principles of shutters and instruction on phasing and adjustments, gates and sprockets and so on.

Demonstration of the causes of film damage: care and maintenance of mechanisms: replacement of worn parts: fault-finding. Examination of and the dismantling and rebuilding of arc lamps: principles of carbon arcs: high and low intensity arcs (DC and AC): effect of voltage and current, including experiments to illustrate arc characteristics: types of control and feeding mechanisms.

FOURTH YEAR

ELECTRICAL ENGINEERING

Principles of and examination of the construction of alternators: single- and 3-phase AC motors (series, capacitor, repulsion-induction, split-phase, shaded pole, squirrel cage, wound rotor): methods of starting, speed control: maintenance: fault-finding and correction.

Electrical installations complying with Statutory Cinematograph Regulations.

Electrical safety lighting systems including floating and trickle-charged installations, types of charging apparatus: care and maintenance of batteries.

Types and application of discharge lamps (cold cathode, fluorescent, neon and projection): auxiliary apparatus: methods of dimming: types of fittings: electric signs and their maintenance: floodlighting.

Electricity tariffs: types of tariff available: selection of the most economic tariff: calculations: reading of meters.

PROJECTION ENGINEERING

Principles of DC arc supplies—motor generator (shunt and compound): output regulation: ballast resistances: rectifiers (3-phase and single-phase input): arc stabilisation by resistance, reactance and resonance control. AC arc supplies: induction, types and efficiencies. Contactor systems and switchboards associated with arc supplies.

Projection Optical System.—Mirror-type arc lamps: types of mirrors: magnification calculations: collection angle: light loss in transmission: arc lamp speed: projection lenses: calculation of focal length: lens apertures: lens calculations: bloomed lenses: importance of a matched optical system: importance of correct alignment.

Screens.—Types of screens (including rear projection): reflection factors: screen frames: masking: screen illumination: foot candle and lumen measurements picture size: correct viewing conditions.

Soundhead and Amplifier.—Principles and construction of the soundhead: photo-electric cells: optical systems: constant speed devices: voltage amplifiers: faders: main amplifiers: tone control: HT supplies: loudspeaker assemblies (HF and LF): energised and permanent magnet types: characteristics: cross-over networks: non-synchronous apparatus: types of pick-up: types and principles of operation of microphones: deaf-aid equipment.

THE KINEMA

Statutory Cinematograph Regulations.—Some effective provision should be made throughout the course to draw

(*Continued on page* 34)

New Strong Slide Projector Uses AC Arc

Built around a 45-ampere AC arc the slide projector pictured below delivers a rated 7500 lumens of light for the projection of still slides with motion picture brilliance, according to its manufacturer, Strong Electric Corp. It can fill a drive-in screen with satisfactory illumination, its maker claims.

New Strong AC arc slide projector, burning 45 amperes, which is rated capable of projecting slides with adequate brilliance even on a large drive-in screen.

The rated illumination of 7500 lumens is, of course, the equivalent in brilliance of twice that figure in motion picture projection, since in slide operation there is no shutter light loss. Absence of a shutter also permits flickerless performance with an AC arc.

The slides are effectively cooled by a 50 cmf blower and can be projected for an hour or more without damage even in the case of dense slides, it is claimed. Slides measuring either 2" x 2", 3¼" x 4", or 4" x 5" can be projected. Carbons, motor-driven, are 6-mm x 7"; and a pair will burn for 80 minutes at 45 amperes, 21 volts. No power source is needed other than a 110-volt AC socket—the equipment is merely plugged in.

The projector is mounted on adjustable legs which permit adjustment to an optical center at any height of from 36" to 55", and any projection angle between 27° downward and 10° upward. Length of the projector barrel is 78". The optical system incorporates a 10¼" glass mirror and three lenses.

Electrical Indicating Instruments*

Voltmeters, Ammeters, Wattmeters—Their Accuracy Depends on Proper Use

By C. C. PETERSEN

WHEN we become familiar with electrical indicating instruments of the common garden variety—and most of us use them at one time or another—we become aware of two significant things: each instrument is an individualist and should be calibrated in order to be trusted; and each of the many operating principles used, in say a voltmeter, has its limitations and its area of advantageous application.

This discussion is limited to portable electrical indicating instruments such as voltmeters, ammeters and wattmeters.

Calibration

Calibration of an electrical indicating instrument implies comparison with a known standard, that is, applying the same voltage, current or power to both the standard and the instrument being calibrated and recording the indications of both instruments. The Ohmite Laboratory of Precision Measurements at the Foundation maintains laboratory standard instruments of the type shown in Fig. 1.

These instruments are equally accurate, ± 0.1%, on direct current or at alternating frequencies up to 1,000 cycles per second. Comparison with these standards is a straightforward matter. The question arises, though, "How do we know they are accurate?"

Calibrating these instruments requires the use of standard electro-chemical cells whose stability has been studied over a period of years and whose present value is known by virtue of frequent comparison with the national standards at the Bureau of Standards in Washington, D. C.

Also required are stable resistors or shunts of known resistance value, likewise periodically compared with the standard ohm in Washington. A cell with a Bureau certificate no older than three months, and resistors of all usual values with certificates no older than one year, are on hand at the Ohmite Laboratory at all times.

The standard cells are inherently less stable than resistors, the voltage being stated to six significant figures but certified to only five figures. Typical drift in one year is approximately 0.002%. Standard resistors have values stated and certified to one part of one million, and are extremely stable. A typical cell, a standard resistor and their certificates are shown in Fig. 2.

These indicating instruments are evaluated with direct current. By virtue of their operating principle and their careful construction they are equally accurate on alternating current frequencies up to 1,000 cps.

The standard indicating instruments, thus established in accuracy, provide a rapid means of calibrating other instruments within their range. Their ranges may be extended by the use of instrument transformers which are certified at the National Bureau of Standards. Often direct current instruments are compared directly against the standard cells and resistors by means of a potentiometer. Calibration at higher frequencies requires thermocouple instruments which may be established at low frequencies and will then be accurate at very high ones.

Classification of Indicating Instruments

Electrical indicating instruments may be classified in several manners. One common classification corresponds to their general usage and correlates to a great degree with accuracy. Laboratory standards, costing in the order of $1,000 apiece and of ± 0.1% accuracy, have already been described. The instruments are provided with leveling devices for maintaining them in a horizontal position and should not ordinarily be moved.

Portable instruments for general use range in accuracy from 0.25% to several per cent and in cost from $200 to $20 approximately. Panel type instruments are compact, inexpensive units for apparatus in which general practice requires numerous panel-mounted instruments of reasonable but not exceptionally high accuracy. Switchboard type instruments are rugged instruments with large, easily read scales and usually have an accuracy of about ± 1%. Fig. 3 shows representative instruments of various classes.

Portable instruments are probably the ones most abused and the type in which more errors in selection are made than in the other types. It is the purpose of the following discussion to provide some help in choosing the proper instrument for a particular application.

FIG. 2. One-ohm standard resistor and standard cell, with National Bureau of Standards certificates.

It is well to know how much accuracy is required in the measurement being made and then to select an instrument compatible with that requirement. It is as inappropriate to use a 0.25% instrument for a measurement requiring an accuracy of ± 10% as it is to use a surgeon's scalpel to dig potatoes, though it is sometimes done in a pinch.

Manufacturers' catalogs describe their instruments and specify accuracies. It will be found that the better instruments have many common features including long scales, preferably with a reflecting surface for reducing parallax in reading the pointer position, sharp or knife-edged pointers, and balance weights to allow the instrument to be used in almost any position, though the horizontal position is the safest.

Other features not so easily discerned are spring-mounted pointer stops to absorb shock, jewel bearings, damping, which may be accomplished by air vanes

*The Frontier, Armour Research Foundation

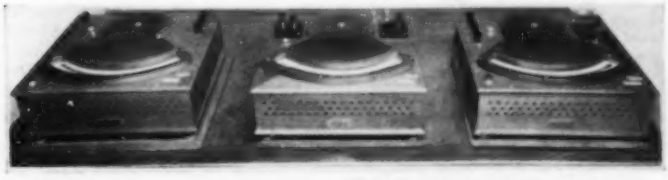


FIG. 1. Weston Model 326 laboratory standard instruments; accuracy 0.1%.

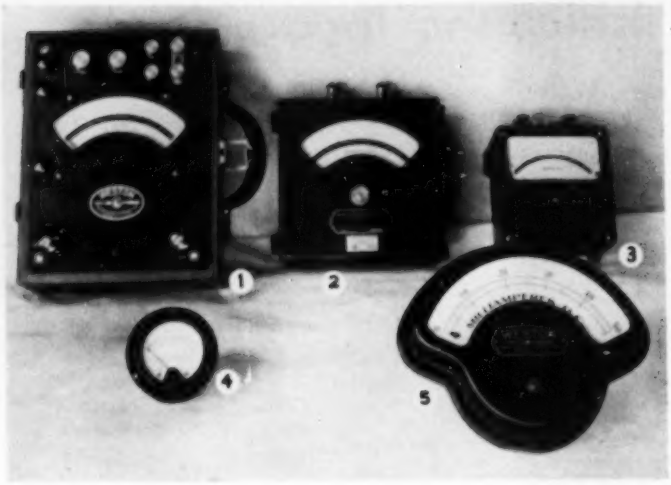


FIG. 3. Typical electrical indicating instruments: (1) electrodynamometer type, 0.25% accuracy, portable; (2) moving iron type, 0.5% accuracy, portable; (3) permanent-magnet-moving-coil type, 0.5% accuracy, portable; (4) moving-iron type, 2% accuracy, panel; (5) permanent-magnet-moving-coil type, 1% accuracy, switchboard.

or by electromagnetic means, and soft iron shielding which provides a path for outside magnetic fields.

The operating principle of an electrical indicating instrument in general determines whether it may be used for direct current or alternating current measurements, and over what frequency range it is suitable. This subject is covered in some detail in an appendix. In many instances instruments constructed for use at certain frequencies may be compensated for use at somewhat higher frequencies.

The insertion of the instrument in the circuit always modifies the circuit conditions. Generally, the effect of this modification is negligible. However, a voltmeter which takes appreciable current compared to the load current or an ammeter which has an appreciable voltage drop compared to the load resistance can cause appreciable error. Each case should be analyzed by itself to determine the effect of instrument insertion.

In selecting an instrument, other things being equal, one which gives an indication in the upper half of the scale is to be preferred. Then the limit of error of the instrument, stated in terms of full scale deflection, will not be as large compared to the measured value as if a small deflection were accepted. Also, better readability is obtained because of better spread of the scale.

The various principles on which commonly used portable indicating instruments operate are outlined in the appendix[1] following, and the applicability of each type is generally indicated.

In conclusion the following is quoted from F. K. Harris, Physicist of the National Bureau of Standards[2]: "The art of measurement is as much a matter of one's attitude and way of thinking as it is a collection of devices and techniques whereby one can push buttons or turn knobs and so learn how big something is or how nearly alike two things are." We must give attention to details even in so prosaic a device as a voltmeter if we desire a true measurement.

The appendix which follows describes in greater detail the types of instruments spoken of in this article. Instruments are there broken down by five general types, with variants of some of the types also listed.

[1] Some of this data has appeared in a manual entitled "Electric Instruments" published by the General Electric Company, GET-1087.

[2] Electrical Measurements, John Wiley & Sons, 1952.

APPENDIX

Characteristics of Portable Electrical Indicating Instruments

1. PERMANENT-MAGNET, MOVING COIL INSTRUMENTS:

USE: Direct current.

PRINCIPLE: Movable coil carries measured current; interaction with permanent magnet produces torque.

COILS: Wound to carry from 20 uA to 25 ma.

CURRENT: Range extended by shunts, built-in up to 50A.
Higher current requires external shunts.

VOLTAGE: Used with internal series resistor.
External resistors, called multipliers, used for very high d-c voltages.

SCALE: Essentially linear.

ACCURACY: Very good; 0.5% commonly attained.

VARIANT: MOVING-MAGNET INSTRUMENTS:
Same principle, but different construction.
Has cylindrical moving magnet.
Low sensitivity, sturdy, low cost.

2. RECTIFIER INSTRUMENTS: Full wave rectifier and permanent magnet d-c instrument.

USE: Frequencies up to 10 KC. Measures average, not rms value. When scale is marked in rms units, instrument must be used on sinusoidal wave-shapes.

PRINCIPLE: Rectifier bridge converts alternating to unidirectional current.

COILS: High sensitivity moving coil element permits sensitivity of 1,000 ohms per volt.

CURRENT: Rectifier limited to about 15 ma. Mostly used in milliampere and microampere range. Not suited for use with shunts due to temperature coefficient of the rectifier. Can be overloaded several hundred percent.

VOLTAGE: Series resistor in a-c input.

SCALE: Essentially linear.

ACCURACY: ± 5% due to aging of rectifier.

3. THERMOCOUPLE INSTRUMENTS (RADIO-FREQUENCY INSTRUMENTS):

USE: Frequencies up to several million cycles per second; indicates rms values of any wave form. Direct current also, but offers no advantage, except as means of calibrating.

PRINCIPLE: Resistance heater is energized by measured current and raises temperature of a thermo-junction. Generated voltage deflects permanent magnet moving coil element.

COILS: Extremely light armature, low resistance (5 ohms), full scale response at about 15 mv.

CURRENT: Normal use—limited only by heater coil construction—3 ma to 300 A. Great danger of damage by overloading since heater temperature increases as square of the current.

VOLTAGE: Not normally used for voltage, but can be used with resistor in series with heater. Can provide sensitivity up to 500 ohms per volt. 0.5 to 150 volts.

SCALE: Normally compressed at low end, but may be linearly expanded by applying non uniform magnetic field in the element.

ACCURACY: Not as high as other types for DC or low frequency measurements. Ambient temperature error causes some error.

4. MOVING IRON INSTRUMENTS:

USE: A-C generally from 25 to 125 cps, but specially calibrated up to 1,000 cps. In-

(*Continued on page 32*)

Theatre Television Progress†

By NATHAN L. HALPERN
Theatre Network Television, Inc., New York

"Slowly simmering . . . theatre television will erupt suddenly . . . the future is bright," opines this author, who is a specialist in the business of providing video programs for theatres exclusively. He reviews the status of theatre Tv today.

THERE ARE four areas covered in this report: (1) the industrial development of theatre television; (2) programs for theatre television; (3) the public's reaction to these programs, and (4) the distribution of programs to the theatres.

Today there are over 75 theatres in 37 cities from coast to coast with large-screen television equipment. Television installations will be made eventually in all motion picture theatres in the country. The harnessing of this form of television by the motion picture industry will offer the public a new and different service. Theatre television will become a valuable national resource.

Audience Reaction and Requirements

Despite its early stage of growth there have already been over 300 individual theatre presentations of large-screen television programs. With few exceptions, these early presentations were experiments, conducted to test public reaction. They clearly demonstrated that this new medium satisfied and pleased its audiences. It has been, in fact, public acceptance that caused the further development of theatre television.

The conditions necessary for successful special event presentations have been emerging in the past year. Exclusivity, proper promotion, and some regularity are desirable, if not necessary. Matinee sports presentations, which bring new sports audiences into theatres at unprecedented times, require all three of these conditions.

A series of six fights, presented by Theatre Network Television (TNT) was offered to a public that was unacquainted with the medium, and for this reason under adverse circumstances, yet the box office results were nothing short of startling. On several of the fights, the numbers of people turned away from box offices for lack of seats were much larger than the number packed into the theatres. The overall average attendance for all theatres on all six TNT fights was 87 percent of capacity, despite the fact that two of the fights were not top attractions. And the turn-away crowds at the more popular fights were only part of the larger population that would have attended but for theatre television's limited capacity to accommodate the public.

† Cond. from J. SMPTE, August, 1952.

Of importance, too was the drawing back of part of the "lost audience"—non-movie-goers—to the motion picture houses. New audiences added to normal film audiences will expand theatre business in the years ahead.

Economics of Theatre Tv

Normally a major medium must pass through an investment period at the start, with operating losses until it has grown sufficiently. The pioneers in home television broadcasting made large-scale investments and sustained high losses for years of operation—losses that ran into millions of dollars for single stations—before they were in the black. The significant thing about theatre television is that it has experienced profits on some events from the outset. But before examining the credit side of the ledger, let's take a look at the debits.

The relatively small losses that were incurred in early theatre television are attributable to the small number of theatres involved to share the program cost, to the pricing policies followed by theatremen, and to the absence of a regular, year-round flow of programs and promotions.

As long ago as last summer theatres carrying the TNT series of prize fights made profits on some fights, in spite of the very small number of theatres participating. Naturally, a larger number of participants will reduce individual costs and turn losses into profits; and the profits will then increase as the number of television exhibitors grows.

Another prime factor in the difference between profit and loss on theatre television events was the initial low admission price policy followed by exhibitors. At the beginning, they were literally giving the product away to see whether people liked it. Some seemed to treat theatre Tv as a bonus added to the feature movie, not realizing that the real box office pull was the television and not the movie.

Canada Inaugurates Tv

Television in Canada was inaugurated September 6th, at Montreal. On September 8th a second station went on the air, from Toronto. Both are government-operated and represent the beginning of a projected nationwide circuit. The third station will be opened next year in Ottawa.

Some theatres charged as little as 54 cents net admission for the first theatre televised fights. But as theatremen saw the public demand and satisfaction, they began to adjust admission prices upward. By the time of the Robinson-Turpin bout the average admission was well over $2.00. Yet every theatre carrying the fight sold out, again evidencing the public's enthusiastic acceptance of this new entertainment medium.

The average television gross was $5,000 per theatre, with seating capacities ranging from 1,100 to 4,000 seats. Moreover, concession sales increased as much as 400 percent above average. It became apparent that if higher prices had been charged for the earlier theatre television events those also might have resulted in substantial profits.

As an example, Theatre X, an actual theatre, has 3,300 seats. At a $2.40 gross admission price, and a sellout with 473 standees crammed in, the net receipts, after taxes, were $7,500. Total television costs to the theatre (relatively high because there are still so few theatre installations) were $4,000, leaving an operating Tv profit of $3,500. After deduction of house expenses and film distribution costs this exhibitor was still left with a whopping profit for a single show. His only regret was that he had to turn away thousands of disappointed people for lack of room.

The third factor affecting early theatre television—absence of a regular, year-round flow of programs—is due in part to the newness of the medium.

Crafts Cooperate

The development of entertainment attractions, to go along with outstanding sports events, has preoccupied those of us in theatre television. Entertainment for theatre television must, of course, be superior. In this developmental work talent and craft unions were faced, for the first time, with making decisions on theatre television. Most of these unions have recognized the importance of this new field and its gainful potentials for their memberships, as well as its public service aspects, and their attitudes have been progressively more and more cooperative.

It is encouraging to report that there is a wealth of superior talent and entertainment eagerly awaiting the development of theatre television. There is no lack of great entertainment, superior to home television, and different from movies, for theatre Tv programs. Once the ground rules have been worked out, TNT will launch a schedule of these programs.

Transmission Limitations

Of paramount importance in limiting the past presentation of theatre television programs has been the unavailability of

(*Continued on page* 30)

IN THE
SPOTLIGHT

PROVISIONS for health and welfare plans have become increasingly important factors in labor-management contract negotiations. In many instances they take precedence over all other benefits. Chicago Local 110 blazed the trail in theatrical employer-labor relations when Gene Atkinson, business representative of the Local, publicly announced on August 5, 1948 the consummation of a five-year pact with all the Chicago area theatres which included a health and welfare fund amounting to $2 million. (*See IP for August*, 1948, *p.* 17.) Since then other IA Locals have followed the pattern set by Local 110 and today such plans have become integral parts of most contracts.

The latest health and welfare plan to come to our attention is that incorporated in the two-year contract recently concluded between San Francisco Local 162 and most of the major and independent theatres in its jurisdiction. We believe that the following highlights of the Local's plan are sufficiently interesting to warrant listing herein:

LIFE INSURANCE: $2500.

ACCIDENT, DEATH AND DISMEMBERMENT: $2500.

ACCIDENT AND SICKNESS: 1st day accident, 8th day sickness, 26 weeks, weekly benefit, $20.

HOSPITALIZATION: $12.00 per day hospital room and board and general nursing care for a maximum of 100 days for each disability.

SPECIAL HOSPITAL SERVICES: All necessary special hospital services when confined as a bed patient, up to $1500.

OUT-PATIENT SERVICES: Use of operating room, anaesthetics and their administration, and diagnostic X-ray and laboratory examinations when *NOT* confined as a bed patient, up to $100.

SURGICAL BENEFITS:

(1) *Surgeon's Fees*—Fee of operating surgeon for surgical operation in accordance with the Schedule of Operations, up to $400.

(2) *Assistant Surgeon's Fees*—Fee of surgeon assisting at operation up to 10% of the fee allowed for the particular operation under the Schedule of Operations, maximum of $40.

(3) *Special Surgical Services* — Special services in connection with a surgical operation performed outside the hospital in a doctor's office or at home, including anaesthetics and their administration, dressings, splints and casts up to a maximum of 20% of the fee allowed for the particular operation under the Schedule of Operations —$80.

(4) *Maximum Benefits*—For all operations during each period of disability—$800.

MEDICAL CARE: Any licensed physician ("MD" or Osteopath)—$4 hospital calls, $400 maximum; $4 office calls; $6 home calls; 1st call accident, 3rd call sickness.

DIAGNOSTIC X-RAY AND LABORATORY FEES: Charges for X-ray (excluding dental X-rays) and laboratory examinations made for diagnostic purposes, in a doctor's office or clinical laboratory, will be paid as follows: $50 maximum.

ADDITIONAL ACCIDENT BENEFIT: All excess medical and hospital expense (including special nurses) required within 90 days of injury sustained as a result of a non-occupational accident which is *NOT* covered by other benefits of the plan, up to $300.

POLIOMYELITIS: All medical and hospital expenses (including special nurses) incurred within *TWO YEARS* of inception while insured, for treatment of poliomyelitis, in lieu of other benefit under the plan, up to $5,000.

• S. A. Seifert, member of Local 203, Easton, Penna., and secretary of the Easton Central Labor Union, attended the recent AF of L Convention in New York City as CLU delegate.

• Peaceful but effective picketing of a theatre is the method used by the officials of Local 322, Charlotte, N. C., against the management of the South 21 Drive-In Theatre in that city. In a letter to this office, D. K. Chastain, president of the Local, outlined the procedure followed by the union which has very definitely cut down box-office receipts.

"We keep a constant check of every car crossing our picket line," writes Chastain, "also those that are stopped by it. We record the numbers of the cars that cross it and after the ownership of each vehicle is established, a card is mailed to the owner the same night so that he will receive it in the morning mail. Receipt of these cards by the picket-line violators meets with varied reactions; but the fact that they are known to us has a very definite restraining effect—this is confirmed by the very few repeaters.

"Our pickets have set criteria for courtesy to all who inquire — explaining briefly and intelligently why we are there. . . . To gauge ahead the results of our picketing would at best be only guesswork, but we do feel that the long-range effect upon other theatres is working to our advantage. We have served notice that we mean business!"

To Local 322 officials we extend our very best wishes for a successful settlement of this controversy.

• The Motion Picture Industry's Joint Defense Appeal appointed three IA men to key posts in the industry's drive on behalf of JDA. Serving as co-chairmen of the Labor Division are Herman Gelber, president of New York Local 306; Thomas Murtha, business representative of Brooklyn Local 4, and Vincent Jacobi of New York Local 1.

• Eighteen months of intensive picketing by the members of Local 163 forced the management of the Scoop Theatre in Louisville, Ky., to close its doors. The efforts of Local 163 officials to effect an amicable settlement with the exhibitor were fruitless and they were left no alternative but to picket the theatre.

• According to a statement released by the U. S. Labor Department's Bureau of Labor Statistics, the retail food price index reached a new peak with an increase of 1.2 per cent between June 30 and July 15.

• The Hollywood Film Council, AF of L, is seeking government aid in barring the importation of films made abroad by persons accused of subversive activities. In a letter to the House Committee on Un-American Activities, Roy Brewer, IA West Coast representative and Council chairman, singled out the picture "Encounter" which was produced in Italy by a group of men who were named as Communists by the House Committee. The film is slated to be released in this country by United Artists. The House Committee has been asked to take action to keep this film out of the American market.

• IA West Coast Representative, Roy M. Brewer •

• A St. John, N. B. (Canada) projectionist has been appointed chairman of

the New Brunswick board of censorship. George Enos, for over a quarter of a century projectionist for the board, was named to the post—the first projectionist in the history of Canada to hold such office.

• Thomas Kearney, president and John Forde, business representative, San Francisco Local 162, attended the convention of the California State Federation at Santa Barbara, September 3.

• An attempt by the Canadian Broadcasting Corporation to televise a stage presentation at the Melody Fair tent show in Dufferin Park, Toronto, was thwarted by officials of the Toronto IA Locals who refused to permit the CBC cameramen to enter the tent. The IA officials based their refusal on their contention that the broadcasting company's technicians were non-union men.

It is expected that the matter of union jurisdiction will come up on the floor of Parliament in Ottawa this Fall.

• Under a new contract signed with the Theatre Owners Association, Chester Demaree, business representative of Local 163, Louisville, Ky., obtained a $2 per week increase for 24 members of the Local. This makes the new wage rate $91 weekly, effective immediately. Manpower was the bone of contention in the negotiations, with the exhibitors wanting to reduce the number of projectionists in each theatre from four to two. Demaree's persistence won out and the manpower remains unchanged.

• According to a recent announcement by the Quebec Liquor Commission, television will not be permitted on premises licensed by the Commission. It is said that the ban is based on the ruling found in the Revised Statutes of the Province of Quebec, as follows:

No holder of a permit to sell certain alcoholic liquor in a hotel, inn, cafe or restaurant shall give any performances or shows or allow dancing, even under municipal authorization, without the Commission's consent.

• Thirty-five Local Unions, affiliated with 20 Internationals, AF of L, were represented recently at the 7th annual Kentucky Labor School, sponsored by the Department of Research and Education of the Kentucky State Federation of Labor. The class comprised 73 students from Kentucky, Ohio, Indiana, and West Virginia.

• Addressing the American Legion convention in New York City last month, William Green, AF of L president, asked for mutual understanding between the Legion and organized Labor. He reminded the delegates that close cooperation between the Legion and the trade union movement would act as a mighty counterforce against the inroads of Communism in this country.

• Hugh Sedgwick, for many years secretary and business representative for Local 303, Hamilton, Ont., was elected by acclamation at the recent convention in Minneapolis to be 8th IA vice-president, filling the office left vacant by the late Wm. P. Covert of Toronto Local 173.

Sedgwick has long been an active figure in Canadian labor circles, and has had the distinction of being the first film

Sedgwick examining a British-made projector at the 1951 Trade Union Congress.

man chosen to represent Canada at Britain's Trade Union Congress, which was held last summer. He is also chairman of the Hamilton Planning Board, and is a member of the board of directors of the Hamilton General Hospital.

Pat Travers, Toronto Local 173, was named secretary-treasurer of District No. 11, succeeding Sedgwick, who held the office for many years.

• From one job to another! IA President Richard F. Walsh just about got his bags unpacked after the 41st IA convention at Minneapolis (ended August 8) before taking ship (August 20) to England to appear as Fraternal Delegate representing the AF of L at the British Trades Union Congress (September 1-8). President Walsh brought to the assembled representatives of British workers the greetings of their American colleagues and a brief discussion of the world situation as it currently affects labor in all democratic countries.

Of particular interest to members of the IATSE was the election of Tom O'Brien (Member of Parliament) to the presidency of the British Trades Union Congress, since O'Brien's trade union position in Britain corresponds roughly to President Walsh's in the U. S. and Canada. O'Brien, MP, is secretary-general of NATKE—National Association of Theatrical and Kinema Employes—the British counterpart of the IA. Many will recall that he scored a striking oratorical success at the IA Cleveland convention in 1948. NATKE and IA have always worked together harmoniously.

President Walsh left Britain shortly after September 8 to appear as a participant in the AF of L convention opening in New York September 15. From one job to another!

Show This to Your Employer

Visible proof that the IA regards itself as a full and helpful partner in the motion picture industry is this match tab, paid for by Local H-63, New York City, and abundantly in evidence at the recent 41st Convention. A number of employers and employer representatives appealed to the Convention for cooperation in inducing the public to visit motion picture theatres more frequently. Among others, Major Leslie Thompson of RKO, pleaded: "Right now we need a booster campaign. . . . Organized labor is in a position where you can boost more effectively than almost any other element in the business."

In answer, IA President Richard F. Walsh made known that the IA is already doing just that, and cited this match tab as one example. Said Walsh: "We have started on the drive and have done everything that COMPO has asked us to do. Our Locals have done things in the cities and towns. . . . Delegates have shown me match boxes and posters and little trinkets they have gotten up themselves and paid for. . . . They are in there pitching."

The American Labor Movement

Prepared by the Department of Labor for official use and reference, this history traces labor activity and legislation from Colonial times to today.

Chapter II. Development of the Modern Labor Movement

THE Noble Order of the Knights of Labor was founded by Uriah S. Stephens in 1869 as a small local union of Philadelphia garment workers. It expanded slowly as various other craft unions joined. For some years it functioned as a secret society with an elaborate ritual, a practice best understood in the light of the difficulties experienced by unions at the time when, as one contemporary labor leader wrote, "a great deal of bitterness was evinced against trade-union organizations, and men were blacklisted to an extent hardly ever equaled." Most of the secrecy, however, was abandoned by 1881.

From an estimated membership of 10,000 in 1879 the Knights of Labor grew rapidly until by 1886 it claimed over 700,000 members throughout the country. Structurally, the Knights consisted of a national body or general assembly exercising centralized control over numerous district assemblies, each of which was composed of five or more local assemblies. Local assemblies were of two kinds, trade and mixed. The former included members of only one craft while the latter admitted a wide range of occupations and professions. The first general assembly, called in 1878, elected Stephens as Grand Master Workman. He resigned shortly thereafter and was succeeded by Terence V. Powderly.

The Order had a broad aim: the replacement of a competitive society by a cooperative one which would give workers the opportunity to enjoy fully the wealth they created. This was to be achieved primarily through reducing the "money power" of banks, not through battles with individual employers. More concretely, the Knights' program called for the 8-hour day, equal pay for equal work by women, abolition of convict and child labor, public ownership of utilities, and the establishment of cooperatives. Reliance was placed on educational and political methods rather than on collective bargaining. Strikes were to be employed only as a last resort.

During the eighties, however, when the "practical trade unionist" forces gained influence, the Knights engaged in a series of strikes for better wages and made wage agreements with employers. Their most successful struggle, with the powerful Gould railway system in 1885, brought them particular prestige.

Samuel Gompers

An internal conflict led to the decline of the Knights of Labor. Leaders who favored processes of collective bargaining clashed with those committed to political means and basic social change. Moreover, the immediate interests of the skilled and unskilled workers whom the Knights attempted to unite were not so easily reconciled. The stronger craft unions resisted affiliation and by 1886 came into open rivalry with the Knights of Labor.

After formation of the American Federation of Labor, the Knights steadily lost ground. In 1890, the Knights reported only 100,000 members. Thereafter, the Order continued to lose members and ceased to be an influential factor in the labor movement, although continuing in existence until 1917.

The American Federation of Labor

By 1881 the nucleus of a new organization had taken shape. Devoted to "pure and simple unionism," its goals were higher wages and improved working conditions. The craft unions surviving the depression of 1873 were almost exclusively absorbed in problems of their respective trades. Many of these unions developed strong, centralized, national organizations supported by an increasing number of local lodges. Benefit funds were also collected to assist their members or their families during strikes and times of financial stress due to unemployment, injury, or death.

In 1881, six prominent craft unions—those of the printers, iron and steelworkers, molders, cigar makers, carpenters and glassworkers—and a variety of other labor groups met in Pittsburgh and established the Federation of Organized Trades and Labor Unions. Its leaders were Samuel Gompers and Adolph Strasser, both of the cigar makers' union. At the start the Federation had approximately 45,000 members; for 5 years it remained weak and was overshadowed by the Knights of Labor.

When the Knights at their annual convention in 1886 refused to agree to respect the jurisdiction of the large craft unions, several of the latter met at Columbus, Ohio, and founded the American Federation of Labor. The F.O.T.L.U., also in convention at Columbus, amalgamated with the new group. Gompers was elected first president of the new Federation, a position he held, with the exception of 1 year (1894-95), until his death in 1924.

The strength of the AFL resided primarily in the unions of carpenters, cigar makers, printers, iron and steelworkers, and iron molders. It began with a membership of about 138,000 in 1886 and slowly doubled that number during the next 12 years.

Renewed Industrial Conflict

In the three decades following 1890 the AFL consolidated its position as the principal federation of American unions. The first decade of growth was slow, but from 1900 to 1904 membership rose rapidly, from half a million to a million and a half, and then increased irregularly to 2 million by the outbreak of World War I. During and immediately following the war years, membership again rose rapidly, reaching more than 4 million in 1920.

During this entire period an estimated 70 to 80 percent of all union workers were in the American Federation of Labor. The most important unaffiliated group of unions was the four railroad brotherhoods which usually maintained friendly relations with the AFL affiliates. The other nonaffiliated unions were a mixed group. They frequently were rivals of the AFL unions. Some were AFL secessionist groups. Membership among this "independent" or unaffiliated group rose from approximately 200,000 in 1900 to almost a million in 1920, according to estimates Prof. Leo Wolman made for the National Bureau of Economic Research.

Before World War I the principal union gains occurred in the coal mining, railroad, and building-trades unions. The most important union of coal miners was the United Mine Workers, an industrial union which, after a strike in 1902, established itself as the largest and one of the most completely organized affiliates of the AFL. In other industries, organizations of crafts or amalgamated crafts still largely prevailed.

The emergence of the labor movement as an influential national economic group

did not occur without opposition or setbacks. In the 1890's, large corporations which had appeared on the economic scene vigorously fought the efforts to unionize their employees. At times these clashes resulted in violence, injuries, and even death. For example, the unsuccessful struggle of the Amalgamated Association of Iron and Steel Workers against the Carnegie Steel Co. at Homestead, Pa., in 1892 was climaxed by a pitched battle between company-imported Pinkerton detectives and strikers which resulted in 10 deaths before the intervention of the National Guard restored order.

The strike of the American Railway Union led by Eugene V. Debs against the Pullman Palace Parlor Car Co. at Pullman, Ill., in 1894 provoked sympathetic walk-outs on many railroads serving the Chicago area. Federal and State troops were used and court injunctions were obtained against the union. Twenty-five persons were killed and 60 were injured during this controversy. Elsewhere in the country industrial disputes sporadically flared into open violence.

After 1902, following a period of rapid union growth, employer opposition stiffened and became more highly organized. Prof. Carroll Daugherty, in summarizing this trend in his book *Labor Problems in American Industry*, wrote:

> Most of the powerful ones [employers], believing that unionism was growing too strong and fearing further encroachments on their control of industry, decided to break off relations, and the years from 1902 to World War I were characterized by a definitely increasing anti-unionism.

Daugherty then adds:

> Scientific management and "efficiency" systems were introduced in many plants, much to the discomfiture of many skilled craft unions. A variety of union-smashing tactics were adopted by employers. Vigilante groups and citizens' committees were fostered to resist unionization activities. Court decisions upheld as a rule most of the employers' anti-union practices. In the face of these new difficulties the membership of the AFL at first fell off a little and then resumed growth at a much slower rate than before 1902.

Despite general employer opposition to unions, however, an increasing number of "trade" or collective-bargaining agreements were resulting from direct negotiations between unions and employers. The stabilization of industrial relations and the attainment of job security are considered by many authorities as important factors in the success of AFL trade-unionism at this period.

Labor's "Nonpartisan" Politics

During the years between 1900 and the beginning of the First World War, unions concentrated on raising wages, establishing the 8-hour workday, and securing other improvements in working conditions through collective bargaining. On the whole, they resisted the efforts of various political forces in the labor movement to obtain union support for partisan programs.

The political role of organized labor was debated in various conventions of the AFL at the turn of the century when, according to Lewis Lorwin, "The principle of non-partisan politics, summed up in the dictum 'to defeat labor's enemies and to reward its friends,' received official sanction." In practice this principle meant that the AFL opposed any "independent labor party" but officially supported measures and candidates and even the programs of regular political parties favorable to the interests of labor.

As a consequence, labor was frequently successful in obtaining legislative reforms. The first years of the century, for example, saw the passage of several State laws regulating the employment of women and children in industry and providing for protection against industrial hazards. Workmen's compensation laws were adopted in most States, and in 1913 the United States Congress created a separate Department of Labor.

Clauses inserted in the Clayton Anti-Trust Act of 1914, at the insistence of the AFL, exempted unions from prosecution on the ground of engaging in restraint of trade and sought to limit the issuance of injunctions by Federal courts in labor disputes. This law was hailed by Samuel Gompers and others as the "Magna Carta" of labor. Enthusiasm over the Clayton Act was short-lived, however, since subsequent court interpretations virtually nullified labor's anticipated gains.

In 1915, Congress passed the Seamen's Act, regulating many of the conditions of employment for American sailors; the

(*Continued on page 30*)

New Aluminum Gimmick for Handling Hot Carbons

By J. G. JACKSON
Capitol Theatre, Port Alberni, B. C., Canada

IN ALMOST all projection rooms a pair of pliers is used to adjust and handle hot carbons. Steel pliers present a certain amount of hazard because of their weight, since if they slip a shattered mirror may be the result. To minimize this hazard, and to provide a gimmick handier than pliers, the writer has made the device pictured here out of scrap aluminum.

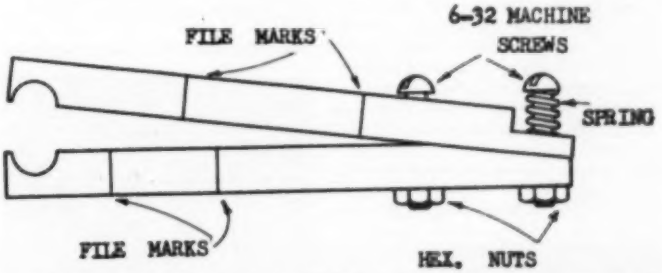
This tool is made of two aluminum bars each 5/16" square and 4" long. The top bar is cut at one end, and the lower bar tapered at one end, as shown. The lower bar is drilled for 6-32 machine screws and the upper bar drilled for slightly larger holes. The lower bar is tapped to take the screws; the hex nuts serve as lock nuts to prevent the screws working loose. The light spiral spring on the back screw keeps the jaws normally open.

The groove at the front of the jaws is made by clamping them together and then drilling with a drill slightly smaller than the negative carbon; for example, a 7/32 drill for a 6-mm negative, 17/64 for 7-mm and 5/16 for 8-mm. This makes for a snug grip on the negative, while the positive carbon is held tightly by the edges of the grooves.

To use, hold the tool in the palm of the hand with fingers and thumb about half way up the bars and simply press with the thumb to grip the carbon; to release, ease thumb pressure and the spring opens the jaws.

File marks on the upper bar are spaced to act as a gauge for positive carbon stubs and those on the lower bar to gauge negative stubs.

[Note: The British Journal of Photography for August 29th reports that Mr. Jackson has just been granted a British patent for another of his inventions, a reel-end alarm, patented in the United States in 1947.]



Aluminum bar carbon gripper developed by the author, with file marks to gauge usable lengths of positive and negative stubs.

16-mm

BECAUSE EXPANSION OF 16-mm ACTIVITY PROVIDES INCREASING FIELDS OF EMPLOYMENT FOR SKILLED PROFESSIONAL PROJECTIONISTS IN TV STUDIOS AND NON-THEATRICAL SHOWINGS, AS WELL AS ENHANCED POSSIBILITIES OF PERSONAL BUSINESS VENTURES, THIS NEW DEPARTMENT OF IP WILL APPEAR MONTHLY HEREAFTER.

IA Locals Active in 16-mm Projection Work

Survey by IP shows 16-mm provides profitable employment for members of half of all IA Locals; and that 50 per cent of the Locals whose members do such work actively seek and claim it through business agents or other direct efforts.

MORE THAN half of all IA Locals, statistically speaking, benefit through 16-mm projection in that their members find varying degrees of employment in the narrow-gauge field. This figure is statistical only; it is based on a survey questionnaire issued by IP. Not all Locals queried responded. Of those that did, more than half, 56 percent to be exact, stated that their members did more or less 16-mm work in addition to standard 35-mm projection.

Among the 44 percent of Locals responding whose members are not recorded as doing any 16-mm work, a number reported that the reason was absence of such activity in their individual territory.

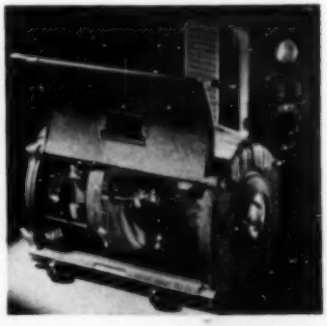
Among that large group of Locals responding whose members do have 16-mm work, fully 50% make an active effort, through the business agent or other facilities, to obtain this type of employment. Among 14 percent the effort is made, not by the Local or its officers, but by the members themselves. The remaining 36% take a more passive attitude toward narrow-gauge work: 21 per cent supply projectionists on request but apparently do not try to bring in such requests; while the efforts and attitudes, if any, of the remaining 15 percent cannot be determined from their questionnaire replies.

How They Get the Work

Many and various are the methods used by different Local Unions to get 16-mm work for their members. Some leave the matter to the initiative of the business agent. Another method is by means of a committee specifically formed to seek out such work and to watch carefully for every chance of it. Another is by standing agreement with various auditoriums in the Local's territory where 16-mm is likely to be shown. Still another is by attending meetings of organizations likely to use 16-mm from time to time. Another is to approach promptly the sponsor of every 16-mm showing as soon as the same becomes known—although one Local official reports ruefully that many of these "have been shown and are gone by the time we find out about them."

Still another method is through a separate 16-mm organization, owned and operated by the Local, which solicits 16-mm business on a business basis. A variation of this approach is an arrangement whereby the Local Union as such owns the 16-mm projectors and solicits opportunities to rent them out, along with the services of the projectionist.

A large minority of Locals, as already noted, find that although they do not solicit or seek 16-mm work for their members, it comes to them. Business firms and other organizations that plan a 16-mm showing voluntarily approach the local IA group and of their own accord seek either to rent equipment or hire a projectionist for it, or both. In such cases, although the Local Union may not own 16-mm apparatus either directly or indirectly, generally some of its members do.



Designed specifically for 16-mm projection, this Strong Electric Corp. type No. 21000 arc has a carbon burning time of one hour—the running time of one 2000-foot 16-mm reel. Current is 30 amperes, providing the maximum intensity of radiant energy that 16-mm stock can withstand without buckling. Trim is 6-mm x 8½-inch positive and 5½-mm x 6-inch negative Pearlex carbons; rated efficiency f/1.6. Associated rectifier incorporates two 15-ampere Tungar tubes, delivers 30 amperes at 28 volts.

Ownership of Equipment and Training

In fact, 18 percent of the Locals whose members do 16-mm work can supply the projection facilities, either as their own property or as the private property of members. In exactly half such cases—9 per cent of the total—the Local is the owner, directly or indirectly; and in 9 percent the members as individuals are.

A 16-mm projector owned by a Local member is not necessarily operated by him. He may rent it out and let another member operate it; in this way the revenue is spread and experience in the use of different makes and models is distributed.

Thirteen percent of the IA Locals whose members do 16-mm work maintain courses of instruction in it. This figure, however, includes those Locals that do not maintain standing classes but give instruction on occasion "as required." Still other Locals find no instruction necessary: their members are familiar with 16-mm units, have had experience with them in the armed services or elsewhere in the past; or are informally instructed by some fellow-member while actually on the job. Still others report that their small membership, or widespread jurisdiction, makes instruction impracticable.

Geographical Distribution

Geographical distribution of IA participation in 16-mm activity is rather uneven, with far the greatest participation—41 percent—in the Middle West. New England and the North Atlantic States come next, with 21 percent of the total. The South and the Mountain States are tied at 14 percent each; and the West Coast lags with only 9 percent.

Among individual states, Michigan leads; 14 percent of all the IA Locals whose members are doing 16-mm work are in Michigan. Massachusetts and West Virginia are tied for second place; 9 percent of all IA locals whose members do 16-mm work are in each of those states.

(Continued on page 28)

How to Book 16-mm Prints

16-mm pictures can be bought, leased, and rented; and thousands can be borrowed without charge. Sources of 16-mm films, and customary procedures for selecting, pre-viewing, booking and showing them, are outlined herein.

THREE procedures are open to the projectionist in the 16-mm field. He can sell his services to operate other people's 16-mm equipment and show their films; he can buy (or rent) 16-mm apparatus and sell the use of it as well as his services. He can also book the picture, offering the entire show—projectionist, projector, *and* film.

The variety of 16-mm product is enormous, far wider than in the case of theatre product. There are 16-mm entertainment films—simply motion pictures quite similar to those shown in a theatre and, in fact, sometimes the same ones—old timers reduced onto the narrower stock. In addition there is a large supply of educational, industrial, and religious films. Films teaching safety or hygiene, training, advertising, and institutional films are also available. Audience for at least some of these films may be found in every community.

Training films are extensively used by industry, and also by the armed forces; there is a huge backlog of these available. Educational films are produced on a number of age levels; the print suited to one age group may be entirely unsatisfactory for another. The same applies to films made for religious education. In addition, there are religious prints that might be described with fair accuracy as sermons on celluloid.

The National Safety Council is one of the sponsors of films that teach safety in industry, on the highway, in farms and homes, first aid, and the like. (Many of these may be obtained without charge.) Advertising films are of two general kinds; some are used by salesmen or sales managers and have a direct selling approach; but others are purely "institutional" or "good-will" advertising. These latter tell an interesting story about some process or industry, or even perhaps some product, but they carry no direct sales message. They are often available without any charge. Travel films are largely similar to 35-mm theatre travelogue reels.

Sources of 16-mm Prints

Some producers make their films available only through local distributors—others directly. Local libraries of 16-mm prints exist throughout the United States and Canada. Dealers in 16-mm photographic and projection apparatus may maintain film libraries.

The extension service of the State university is also likely to have one; and museums, church federations, school systems, social organizations, health agencies, business firms, and industrial plants are among other possible sources of 16-mm prints that may prove just the type needed to please a specific local audience. Currently about two hundred public libraries stock 16-mm prints which are loaned out in the same way as library books. The United States, Canadian, British and other foreign governments have produced films that are available for public showings.

The problem of how to find the desired film or films has two parts: first, to find prints that *may be* suitable and then to arrange a preview to make sure they are. The first is the easier.

To find free prints: More than 2,000 films that are loaned without charge are described in "The Handbook of Free Films," published by Allanan Associates, 509 Fifth Avenue, New York City. The handbook itself is not free— it sells for $10 per copy. The "Educators Guide to Free Films," published in Randolph, Wisconsin, contains a similar listing and sells for $6 per copy.

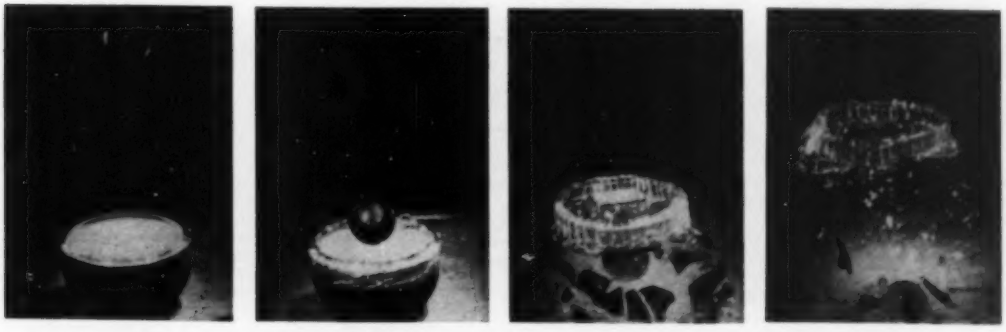
Over 8,000 films, (free, rental and for sale), some offered locally and some only through national agencies, are listed in the "Educational Film Guide," published by H. W. Wilson Co., 950 University Ave., New York City. The Government Printing Office, Washington 25, D. C., sells at 70 cents a booklet entitled "3,434 U. S. Government Films," which catalogs Federal government products available for loan, rental, or purchase.

Information concerning Canadian films can be obtained from the Canadian National Film Board, 1270 Sixth Ave., New York City, or at 400 W. Madison, Chicago. For information pertaining to British films, write to the British Information Services, 30 Rockefeller Plaza, New York City, or 37 South La Salle St., Chicago. The United Nations Film Board, United Nations, New York City, is equipped to supply information on all other foreign films that are available in the United States.

Local sources of films are listed in "Directory of 2002 16-mm Film Libraries," published at 30 cents per copy by the Government Printing Office, Washington 25, D. C. This list is arranged by state and cities and thus is very easy to use. Local film sources may also be found in the classified directory under "Motion Picture Film Libraries." Dealers in 16-mm equipment may know of other local sources of films; these are usually listed in the classified telephone directory under

(*Continued on page* 32)

SEEING EXACTLY WHAT HAPPENS WHEN THINGS TAKE PLACE "QUICK AS A WINK"

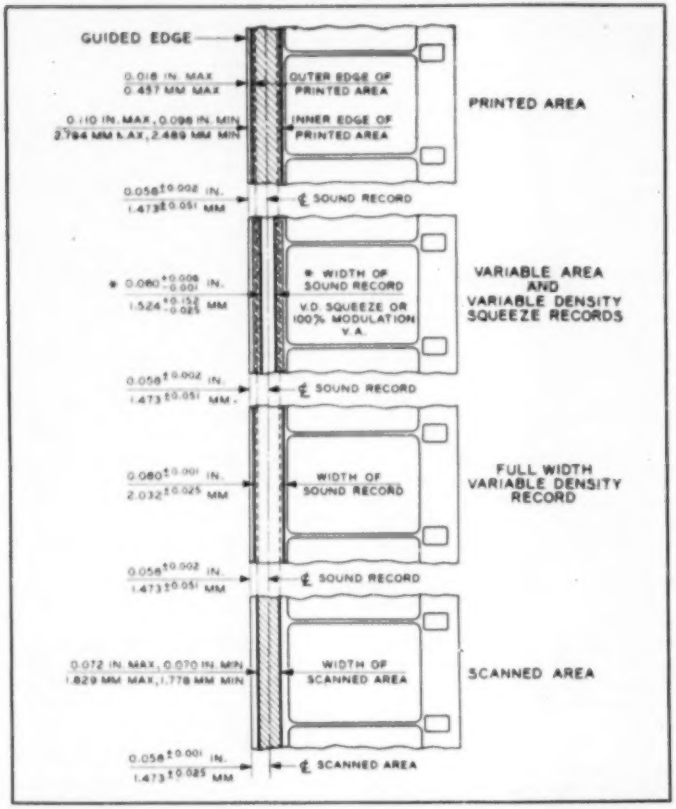


Successive stages in the shattering of a Tv tube as recorded by Eastman's new high-speed camera.

Accepted Standards for 16-mm Projection

PART III

Sound Records and Scanning Area (Z22.41-1946)



These Dimensions and Locations are Shown Relative to Unshrunk Raw Stock

Scanning-Beam Uniformity Service Type Test Film (Z22.81-1950)

1. Scope and Purpose

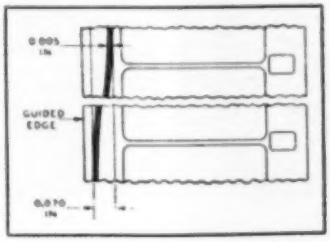
1.1 This standard describes a film which may be used for determining the uniformity of scanning-beam illumination in 16-mm motion picture sound reproducers. The recorded sound track shall be suitable for use in the routine maintenance and servicing of the equipment.

2. Test Film

2.1 The film shall be a print from an original negative. It shall consist of a 1000-cycle, variable-area recording at full modulation of the 0.005-inch width and shall be approximately sinusoidal. The track shall move uniformly 0.067 inch from one edge of the scanned area to the other as shown in Fig. 1.

2.2 The position of the sound track relative to the ends of the light beam at any instant shall be shown by a diagram appearing in the picture area, the size and location of which is shown in American Standard Location and Size of Picture Aperture of 16-Millimeter Motion Picture Cameras, Z22.7-1950, or any subsequent revision thereof approved by the American Standards Association, Incorporated.

FIGURE 1



2.3 The scanned area shall comply with American Standard Sound Records and Scanning Area of 16-Mm Sound Motion Picture Prints, Z22.41-1946, and the film stock used shall be cut and perforated in accordance with American Standard Cutting and Perforating Dimensions for 16-Mm Sound Motion Picture Negative and Positive Raw Stock, Z22.12-1947, or any subsequent revisions thereof approved by the American Standards Association, Incorporated.

2.4 The length of this film shall be approximately 3½ feet.

Appendix

(This Appendix is not a part of this American Standard.)

Before using the above test film it is recommended that correct placement of the scanning beam be determined by means of buzz-track test film as specified in American Standard Specification for Buzz-Track Test Film for 16-Mm Motion Picture Sound Reproducers, Z22.57-1947, or any subsequent revision thereof approved by the American Standards Association, Incorporated.

The uniformity of scanning beam illumination may be measured by means of a db meter connected to the output of the sound projector amplifier. The illumination of the scanning beam should be adjusted according to the instructions furnished by the manufacturer and the variation of the output as registered on the db meter should be observed. The illumination is considered satisfactorily uniform when the output reading as measured by the meter is within ± 1½ db across the entire scanning slit.

Reel Spindles for 16-mm Projectors (Z22.50-1946)

1. Round Section

1.1 The round section of 16-mm motion picture projector reel spindles shall have a finished diameter of 0.312 ± 0.003 inch (7.925 ± 0.076 mm).

2. Square Section

2.1 The square section of 16-mm motion picture projector reel spindles, including finish, shall be 0.312 ± 0.003 inch (7.925 ± 0.076 mm) across the flats. Measurements across the flats shall be made in mutually perpendicular directions.

3. Cumulative Effect of Eccentricity

3.1 The cumulative effect of eccentricity of the round and square sections of the spindles, looseness and misalignment of the bearing, or other mechanical imperfections shall not cause the flange of a tight-fitting reel to depart from the ideal plane by more than 40 minutes of arc.

3.2 A suitable gage for determining the cumulative effect of eccentricity consists of a hub, with coaxial square and round holes

whose respective sides and diameter are equal in length, and a flange of suitable stiffness whose diameter is equal to that of an 800-foot reel flange, 10.5 inches (266.7 mm). The flange should be permanently joined to the hub so that its face is perpendicular to the axis of the hub with not more than 0.003 inch (0.076 mm) runout. The hub shall be provided with a thumbscrew for clamping the hub to the reel spindle so that one side of the round and square holes shall come in contact with the corresponding round and square sections of the reel spindle.

4. Reel Position on Spindles

4.1 The design of spindles shall be such that reels are kept under constant lateral pressure against a shoulder on the spindle. The part forming this shoulder need not be integral with the spindle. However, in such event, it shall be securely fastened to the spindle so that the two parts rotate together.

Multi-Frequency Field Test Film (Z22.44-1946)

1. Scope and Purpose

1.1 This standard describes a multi-frequency sound test film used for testing and adjusting the sound systems of 16-mm sound motion picture projection equipment. The test frequencies on this film are adequate for normal field and general laboratory use.

2. Test Film

2.1 *Frequencies.* The test film shall contain the following series of frequencies, each preceded by spoken announcement recorded at approximately 10 db below full modulation:

Frequency Cycles	Tone Footage Feet
400	12
50	6
100	6
200	6
300	6
500	6
1000	6
2000	6
3000	6
4000	6
5000	6
6000	6
7000	6
400	12

2.1.1 *Frequency Tolerance.* The frequency tolerance of the recorded signals shall be ±2 percent of the nominal frequency of each portion of the test track.

2.2 *Recording.* The test film shall be an originally recorded, splice-free, direct playback, positive variable-area sound track, recorded so that the modulated light is substantially constant when the film is reproduced with a scanning beam of negligible width. Modulation of the recording shall be 95 ± 5 percent at 7000 cycles. The level within any one frequency of each reel shall be constant to within ± 0.5 db. The recording shall be accomplished on a recorder so constructed as to keep the flutter content of the film to the absolute minimum consistent with the state of the art. The distortion of the recorded wave, up to a frequency of 3000 cycles, shall not exceed 5 percent.

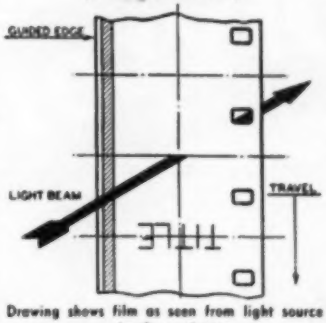
2.3 *Film Stock.* The film stock used for the test film shall be cut and perforated in accordance with the American Standard 16-Mm Sound Motion Picture Film; Cutting and Perforating Negative and Positive Raw Stock, Z22.12-1941, or latest revision thereof.

2.3.1 *Resistance to Shrinkage.* The film stock used for the test film shall have a maximum lengthwise shrinkage of 0.50 percent when tested as follows: At least 20 strips of film approximately 31 inches in length shall be cut for measurement of shrinkage. After normal development and drying (not over +80F [+26.7C]), the strips shall be placed at least ¼ inch apart in racks and kept for 7 days in an oven maintained at +120F (+49C) and a relative humidity of 20 percent. The strips shall then be removed, reconditioned thoroughly to 50 percent relative humidity at +70F (+21.1C), and the shrinkage measured by an adaptation of the pin-gage method outlined in Research Paper RP-1051 of the National Bureau of Standards. The percent shrinkage shall then be calculated on the basis of deviation from the nominal dimension for the length of 100 consecutive perforation intervals given in American Standard Z22.12-1941, or the latest revision thereof, referred to in 2.3 above.

2.4 *Film Identification.* Each test film shall be provided with a suitable leader, title, and trailer, and shall be accompanied by a calibration of the level of the frequency recordings.

2.4.1 *Calibration.* The calibration shall be in terms of light modulation at the photocell with a scanning beam of negligible width, and shall be correct to within ± ¼ db up to and including 3000 cycles, and within ± ½ db above 3000 cycles up to and including 7000 cycles. The correction for each frequency shall be so stated that it will give the true level when the correction is added algebraically to the output level measured using the film.

Emulsion and Sound Record Positions in Projector (Z22.16-1947)



Drawing shows film as seen from light source in the projector

1. Emulsion Position

1.1 The emulsion position in the projector shall be toward the lens, except for special processes.

2. Speed of Projection

2.1 The speed of projection shall be 24 frames per second.

3. Distance Between Picture and Sound

3.1 The distance between the center of the picture and the corresponding sound shall be 26 frames.

Sound-Focusing Test Films (Z22.42-1946)

1. Scope and Purpose

1.1 This specification describes test films to be used for checking the focus of the scanning beam of 16-mm sound motion picture projectors.

2. Test Films

2.1 The test films shall have an originally recorded variable-density sound track, heavily overmodulated and developed to high contrast so that the resultant track is essentially a square-wave track.

2.1.1 The test films shall be of 2 types:
Type A—7000-cycle recording for manufacturing and precision adjustment of sound focusing;
Type B—5000-cycle recording for quick field adjustment of focusing.

2.2 The sound track shall have correct azimuth within ± 5 minutes of arc.

2.3 Each test film shall be provided with a suitable leader, title, and trailer.

2.4 The standard length of the test films shall be 100 feet.

Endless-Loop 16-mm

Health movies may soon be shown to patients waiting their turn in doctors' offices and clinics by means of automatically operating 16-mm projectors, if tests now under way at the University of Chicago work out. Ampro and Bell & Howell units are being tried in association with Triangle Repeater mechanisms that manipulate film as an endless loop, replaying itself indefinitely. Robert D. Hall, President of Commercial Picture Equipment, Inc., of Chicago, is working out the technical details. Since operation is automatic projectionists will not be needed as operators but if the practice becomes wide-spread technically skilled persons may be needed for repair and maintenance.

500 New 16-mm Titles Available

Five hundred new 16-mm films have been acquired by the American Museum of Natural History, New York, and are now available at nominal rental fees either in color or in black-and-white as preferred. Educational in nature, they cover such diverse fields as sports, business training, natural history, civics and vocational guidance. Catalogs can be obtained from the Museum's Film Division, 79th Street and Central Park West.

LETTERS TO THE EDITOR

To the Editor of IP:

Dear friends "up over", your circular letter re my non-renewal of subscription found my face red—let me hasten to explain that we "down under" have our currency in pounds, shillings and pence Australian—and no dollars. My last subscription was paid through an agent, but since then we have had a law passed down on us—no dollars at all, not even for education — which your magazine definitely is.

I wish to thank you for the complimentary copy of IP which I have read and re-read, and also for the high standards which you maintain. It does our hearts good to see your magazine down here where "Simplex X-L" is something we have only read about. The latest Simplex in this country is the E-7. One of our own latest Australian-made jobs is the Raycophone CP7, which is classed as the job for the intermediate size show. Sound and projection heads are integrally housed, the soundhead being of the inverse scanning type with excellent performance. I installed one at the coalfield theatre of the leading electrical supply authority of this country, and it has just finished 2¼ years excellent service in very dusty and unsatisfactory projection surroundings.

Well, friends, if I get wound up I'll write all evening; as this is Sunday I think I'd better do the bankrupt exhibitor's act and close. I am in correspondence at present with your Australian representatives—McGills—and I feel certain that it only will be a matter of time until my luck is in again and my name back on your mailing lists.

ARTHUR T. CURTIS
Australia

To the Editor of IP:

I discovered a thin wire brush at Sears Roebuck which is the thickness of a splice and gives a wide brushing surface. At 25 cents it is well worth projectionists trying it. It works equally well with safety and nitrate bases and is easy to clean. I use it with a rotary motion that brings all the bristles into play. Some caution is necessary; too much of the base can be removed unless care is exercised. This item is not listed in the regular Sears, Roebuck & Co. catalog. I found it in their Fordham Road (Bronx, N. Y.) store. It is called "wire utility brush" number 3651; should any other readers wish to buy it I believe this identification will be adequate.

I would like to take this opportunity to tell you of the worth of "our" magazine. During this period of constant change and introduction of new ideas and equipment, I have never found myself at a loss to explain the whys and wherefores to other projectionists. To take just the recent issues, the series on the intermittent movement and the article on parallax barriers are illustrative of the above. The article on the new Eastman projectors was just so much "lagniappe"* as they say in New Orleans.

ALFRED E. REVZIN
New York City

* Louisiana French-Spanish word meaning for free, extra, the thirteenth roll the baker used to give you when you bought twelve.

To the Editor of IP:

The plastic reel can produced by the Eastman Kodak Company for 16-mm films, shown in *International Projectionist* for June, 1952, may be the first step in the solution of a lot of shipping prob-

A Good Film Cement makes a Good Splice
...Use Ethyloid and you use the Best!
ETHYLOID
Available at all Theatre Supply Dealers...in every state in the Union.
FISHER MANUFACTURING CO., 1 SALTER PL. Manufacturing Chemists, Rochester 13, N.Y.

lems. I hope the engineers of the Kodak Company will put their heads together and devise a plastic reel and can for 35-mm films. These would be much lighter than the heavy reels and containers now in use, would not bend, and would save the films from damage. Light cans of composition material are now in use for films which are shipped by plane. why not make all cans of plastic, and save metal for defense?

M. H. WINTON
Kimball Theatre
Yonkers, N. Y.

To the Editor of IP:

I suggest that Hollywood place third dimension inserts in all releases from now on. These to run only a few minutes and be of important scenes only. The exhibitors would spend nothing except the price of the viewing spectacles. Cues telling the audience when to put on the spectacles could be inserted to show on the screen just before the third dimension appears.

This idea might save many houses now threatened with closing and many jobs. What do other projectionists think?

W. L. MALLOY
Brandt Theatre
Harvey, Illinois

Takes Pictures in Darkness

An ultra-sensitive infrared motion picture film, that can take pictures in darkness or semi-darkness, has been announced by Eastman Kodak. It has been used successfully to photograph reactions of a theatre audience when houselights were dimmed to provide only one-seventieth of normal room illumination. Nature-film producers could use the new material to photograph wild animals at night without alarming them. Primary use of the film, however, is industrial, particularly in high-speed photography of flow or other action of hot or molten materials.

Audio "Fair" Oct. 29-Nov. 1

Audio Engineering Society's 1952 Convention and "Fair" will run four days, instead of three as in previous years. Dates are October 29 to November 1, inclusive, at the Hotel New Yorker, New York. Public address, recording, and other audio equipment will be on display. The exhibits this year will represent not only the latest products of American manufacturers but a number of European and Canadian models. By way of contrast visitors will also find on exhibition Edison cylinder-type phonographs, gooseneck loudspeakers of the 1920's and four-ounce magnetic phono pickups of the 1930's.

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Yes "MOVIES ARE BETTER" and they're "BETTER THAN EVER" if you use Super Snaplite f/1.9 Projection Lenses. These superb lenses give you maximum light, maximum sharpness, and maximum contrast . . . maximum viewing satisfaction for your patrons.

True speed of f/1.9 in every focal length up to 7 inches.
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TESMA Show Bookings Boom

More than 75 exhibit booths for the TESMA-TEDA-ASA trade show and convention have already been booked. Roy Boomer, secretary of the Theatre Equipment and Supply Manufacturers Association, announces. A total of more than 150 exhibit booths are expected to be engaged by the time the trade show opens, November 15th, at the Morrison Hotel in Chicago. It will run through the 19th of that month. Allied States Association of Motion Picture Exhibitors and Theatre Equipment Dealers Association are participating with TESMA this year. TEDA has done so for many years past.

Among the 75 manufacturers who have thus far booked exhibit space are the following whose products are of direct interest to projectionists:

C. S. Ashcraft Mfg. Co., Automatic Devices Co., Ballantyne Co., Bausch and Lomb Optical Co., Century Projector Corp., Compco Corp., DeVry Corp., Garver Electric Co., General Precision Laboratories, Inc., GoldE Mfg. Co., Gordos Corp., Hertner Electric Co., Hewitt-Robbins, Inc., Hal I. Huff Mfg. Co., Hurley Screen Co., International Projector Co., Kollmorgan Optical Corp., LaVezzi Machine Corp., Lorraine Carbons, Inc., J. E. McAuley Mfg. Co., Motiograph, Inc., National Carbon Co., Neumade Products Corp., Oxford Electric Corp., Radio Corp. of America, Raytone Screen Co., J. E. Robin, Inc., B. F. Shearer Co., Strong Electric Corp., Superior Electric Co., Trad Television Corp., Vocalite Screen Co., Wenzel Projector Co., Whitney Blake Co., Edward H. Wolk Co.

CONFER ON COMING CONFERENCE

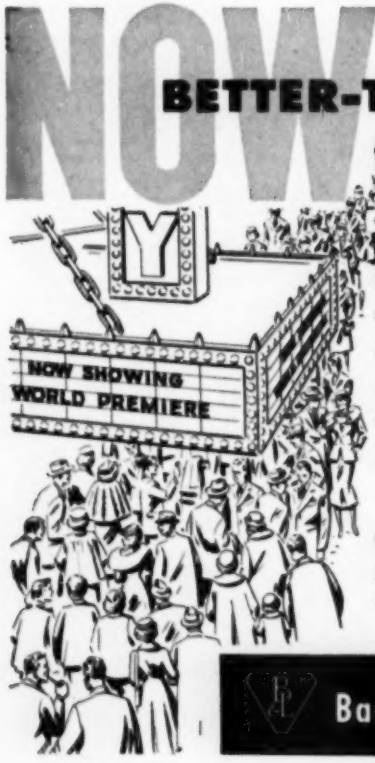
Guiding lights discuss forthcoming trade show. At left is Ray Colvin, president of Theatre Equipment Dealers Association (TEDA); center, Bob Haff, president of Ballantyne Company, makers of projection and sound equipment, and president of the Theatre Equipment and Supply Manufacturers Association (TESMA). Right, is Jack Kirsch, president of Allied Theatres of Illinois. They are conferring on details of the joint trade show and convention to be staged by the three organizations in Chicago's Morrison Hotel, November 17-19.

LOCALS IN 16-MM WORK

(*Continued from page 22*)

There is no third place; or, rather, third place is roughly tie among Arizona, California, Colorado, Indiana, Iowa, Kansas, Maryland, Minnesota, Missouri, New Jersey, New Mexico, New York, Pennsylvania, Washington, West Virginia, and Wisconsin.

The above figures apply, of course, only to Locals involved; not to the amount of activity or amount of compensation earned. These latter data are not available; if they were, and were made the basis of comparison, unquestionably the geographic distribution of activity as set forth above would be drastically different. In any case, however, the figures show that IA locals are active in 16-mm work over the whole nation from coast to coast.



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Big, bright, razor-sharp images on your theatre screen still beat all other types of entertainment competition. B&L Super Cinephor Lenses let you show today's fine films at their brilliant best... keep your patrons coming back! Complete series of lenses... for intimate theatre to mammoth drive-in.

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PERSONAL NOTES

ARTHUR C. BRYAN is now vice president in charge of sales for National Carbon Company. He has been with the organization for 17 years and has been General Sales Manager since 1949. He is a graduate of University of Nebraska, with a degree in electrical engineering.

M. A. MAURER has been appointed to the post of plant manager of RCA's Detroit plant. He had previously been general foreman at the Camden plant. Maurer joined RCA-Victor in 1948 after ten years with Curtis-Wright Corporation, and advanced rapidly. The Detroit plant, which he will now manage, manufactures 35-mm projectors and arc lamps.

ADOLPH R. SCHWARTZ has been transferred from equipment manager of Westrex Corporation to managing director of Westrex Australia, Pty, Ltd. He relieves W. S. TOWER, who has been in Australia for four years and now returns to the U. S. for reassignment.

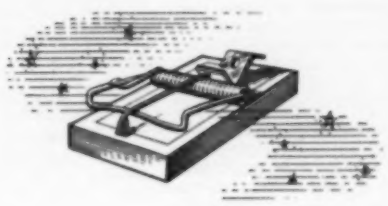
DONALD E. MCCONVILLE is Eastman Kodak's new supervisor of industrial relations plans and procedures; THOMAS H. MILLER becomes assistant to the director of industrial relations; HOWARD L. MILLER has been named general supervisor of wage and salary administration; PAUL A. GERHARD is to be Howard Miller's assistant and FRANK J. FESSENDEN is now assistant director of industrial training. CRAIG P. COCHRANE, director of industrial relations, announced the appointments.

CHARLES C. CATER, III, audio-visual producer and author of many articles on audio-visual techniques, has accepted the post of educational coordinator of the Institute of Visual Training, New York, according to an announcement by WILLIAM J. GANZ, head of William J. Ganz Company, with which the Institute is affiliated.

EUGENE L. SCHROEDER has been named midwest district manager for Radiant Screen Company. Schroeder is the son of the former vice-president and sales manager of Victor Animatograph Corporation, and is an Air Force veteran of World War II. For the past six years he has been associated with the photographic department of Montgomery Ward.

SMPTE Convenes Oct. 6-10

Hotel Statler, Washington, D. C., October 6-10, are the place and time set for the 72nd semi-annual convention of the Society of Motion Picture and Television Engineers. Convention program chairman is J. E. Aiken, of Arlington, Virginia. Regional vice chairmen are: W. H. Rivers, Eastman Kodak, New York; George W. Colburn, Chicago; F. G. Albin, Station KECA-Tv, Hollywood, and G. G. Graham, National Film Board of Canada, Ottawa. Papers committee chairman is E. S. Seeley, Altec Service, New York. Convention vice president Bill Kunzmann visited Washington recently to make convention preparations and commitments.



A
"GOOD PRODUCT"
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A READY MARKET!

. . . your boxoffice statistics will back that up!

Just go over your list of boxoffice hits . . . You'll see that all of them had something extra . . . something special . . . something that made them stand out above the rest . . . Some distinctive quality that gave them a greater appeal than the rest! Proof that a truly "good product" can, and will, draw patrons!

This "good product" theory is applicable to your *theatre* as well as the picture you're exhibiting! For just as there are certain qualities which go towards making a picture a "good product"—so there are certain qualities which go towards making a theatre a "good product" . . . Qualities that contribute towards the comfort of your patrons, the appearance of your theatre or the presentation of your film . . . Qualities which you *must* provide if you are to find a "ready market."

Contact NATIONAL THEATRE SUPPLY and let them help make *your* theatre a "good product."

THEATRE TV PROGRESS

(Continued from page 17)

telephone facilities for network connections. This situation has been a difficult road block. However, the telephone companies have shown increasing understanding of the needs of theatre television, and it is anticipated that AT&T will free more facilities for this service, thereby speeding the growth of the medium and increasing its own returns from it. In this direction, more reasonable charges per individual connection can be expected to be high on the agenda.

As a practical alternative to telephone line transmission, radio channels allocated for theatre Tv are currently under consideration by the FCC. It is expected that FCC will reschedule hearings soon.

Meanwhile the medium continues to move forward. Problems on the road to the future are being solved. Every month the number of theatre television installations increases, the reducing the cost factor per individual theatre. Valuable experience in boxoffice pricing has been gained. Programs are being formulated for production. Intercity and intracity telephone facilities will become increasingly available for theatre Tv programs at reasonable rates.

Theatre television will add fine entertainment of many kinds to its news and sports events. It will provide valuable services in the field of education and in specialized closed circuit services to government and industry.

The theatre needs television. The public has already shown that it will go for it. Slowly simmering during the past period, theatre television will erupt suddenly with its own formula for success in show business. The road may have obstacles, but the future is bright.

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CURTAIN CONTROLS, TRACKS and SPECIAL OPERATING DEVICES
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PSA Honors Kodak Men

The Photographic Society of America's 1952 Journal Award has been granted to Eastman Kodak's Dr. Lloyd A. Jones for "the most significant contribution published in the PSA Journal" during the preceding 12 months. Three other papers by Kodak scientists won honorable mention: one by R. B. Pontius; another by Louis B. Fortmiller and T. H. James, and one by John I. Crabtree, R. W. Henn and H. D. Russell.

Sound Equipment Show

Projectionists interested in the latest sound equipment and techniques will be among the throng at the fourth annual Audio Fair at the Hotel New Yorker, N. Y. C., October 29-November 1. Audio Engineering Society is the sponsor. An attendance of 15,000 is expected.

AMERICAN LABOR

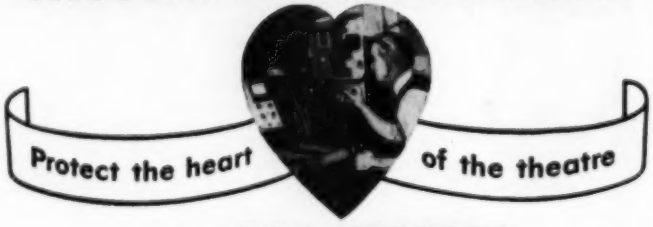
(Continued from page 21)

Lloyd-La Follette Act, giving public employees the right of lobbying and affiliating with labor organizations; and, in 1916, enacted the Adamson Act, establishing a basic 8-hour workday for railroad workers engaged in interstate commerce.

Although the AFL under Samuel Gompers' leadership was successfully developing along the lines of "pure and simple" unionism, a series of unions, more or less revolutionary in character, rose to challenge it. These unions were committed to the doctrine that labor was engaged in a class struggle, and that a political offensive was the best way to advance the interests of labor. On the other hand, the AFL championed the philosophy that gradual improvement of the economic condition of the worker was the only useful course of action to follow, and that collective bargaining was the chief tool to use. After a long struggle, which continued from the 1890's to the First World War, the philosophy of the AFL clearly emerged as the expressed views of the great majority of the country's organized workers.

Opposition to the strict trade-union policies of the AFL unions came from the Socialist Labor Party, the Socialist Party, and the Industrial Workers of the World. The Socialist Party, founded in 1874, was a product of the American section of Marx and Engel's International Workingman's Association, or "First International," formed in 1864. This group attempted in 1895 to form a rival body to the AFL—the Socialist Trades and Labor Alliance. Those within the SLP who believed in winning workers to socialist philosophy without resort to "dual union-

THOUSANDS OF EXHIBITORS



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ism" broke away in 1901 and formed the Socialist Party whose members then sought, unsuccessfully, to change traditional AFL policies from within the federation.

The Industrial Workers of the World (IWW) was formed in 1905 by several dissident union and political groups. It was pledged to the "abolition of the wage system" and to the organization of the great mass of unskilled factory workers and of migratory or "casual" laborers. The IWW organized workers primarily on an industrial basis and was partly successful for a limited period in some areas throughout the country notably in the wheat fields, mines, and lumber camps of the West as well as in a few other scattered areas of industrial tension.

The militant tactics used to press its demands, particularly during the First World War, brought the IWW into public disfavor and caused several States to outlaw the organization. Many of its leaders were prosecuted and sentenced to long terms in prison. Once considered a possible contender to the AFL for supremacy in the labor movement, the IWW declined rapidly after 1913.

Labor and the First World War

During World War I, increased industrial activity and labor shortages brought a rapid expansion of unions. A National War Labor Board was created to promote union-management cooperation and to aid in the settlement of serious disputes which might interfere with the effective conduct of the war. For the first time in the history of the country, a Federal labor agency set forth the right of workers to organize in trade-unions and encouraged collective bargaining with employers through their chosen representatives.

In addition to serving on the National War Labor Board, representatives from organized labor participated on other Government boards and committees dealing with specialized war problems. Their cooperation with Government, on a scale theretofore unprecedented, secured for labor a hearing on specific complaints about industrial conditions as well as a voice in the determination of broad national issues.

Union membership increased in the mining and shipbuilding industries, and also on the railroads which were operated by the Federal Government during the war. Notable gains were made also in the packinghouse, textile, men's clothing, food and leather, and metal-trades industries. Large groups of semiskilled and unskilled workers were, for the first time, brought within the trade-union movement.

As a result of organizing activity in the favorable climate of Federal protection, union membership increased to more than 5 million by 1920.

More important than the numerical gain in union membership were the economic gains made by the workers, particularly during the years of, and immediately following, the First World War. Average hourly earnings in all manufacturing industry, which were about 15 cents in 1890, rose slowly to 22 cents in 1914, then jumped to 48 cents in 1919. In 1923, they were about 52 cents. At the same time, average hours worked per week in all manufacturing declined from more than 60 in 1890 to 49 in 1914. In 1923, the average workweek approximated 46 hours.

[TO BE CONTINUED]

GPEC Wins Government Contracts

General Precision Equipment Corporation and its subsidiaries have now been awarded government contracts for production of airborne electronic apparatus. International Projector Corporation (Simplex) and General Precision Laboratory, maker of large-screen theater television equipment, are among the subsidiary organizations. Others include Librascope, Inc., of Glendale, Calif.; Askania Regulator Company of Chicago and Kearfott Company, Inc., of Little Falls, N. Y. Backlog of government orders entrusted to General Precision Equipment subsidiaries is currently reported to be in excess of $110,000,000.

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BOOKING 16-MM PRINTS

(*Continued from page 23*)

such listings as "Audio Visual Equipment" or "Projection Apparatus."

More difficult than locating prints which may possibly or probably fill an indicated need is arranging a booking to make sure they do. Especially if the film is to be obtained from a national source, such as its producer or prime distributor, the practicability of borrowing it for preview becomes dubious. Some national distributors have made such loans and still do, but the practice is obviously uneconomical.

Local rental and distributing agencies can more easily cooperate in this way, and may be more inclined to do so. But even they may be reluctant to lend the film twice in order to rent it once; and very reluctant to lend out ten films in order that a customer may select one for one paid showing.

The local Film Council, if there is one, is a help here. Some hundred or so of these Councils now exist; their central organization, the Film Council of America, hopes there soon will be thousands; there is no reason whatever why a professional projectionist should not take the lead in organizing a film council in his own community if there is none as yet. These Councils are composed of persons interested in use of 16-mm films —educators, religious leaders, industrialists, social service and other community leaders. They meet at predetermined times to look at 16-mm prints that may or may not be suitable to their respective needs. Film producers and distributors are more likely to make prints available free to such an association than to an individual, since the chance that a commercial rental or sale will result is multiplied by the number of members in the Council. Or if the desired film cannot be obtained under any circumstances without renting it, that trial-rental cost is shared among the Council members and not carried solely by one of them.

Terms and Conditions

The terms on which 16-mm films can be obtained vary from a purchase price of hundreds of dollars per picture downward through various lease and rental rates to a free loan. Shipping costs, and charges made for damage to the film while in the borrower's hands, also vary; some distributors have a minimum film damage charge which must be paid if the print is injured at all; some offer a "film damage insurance" through which this possible complication can be written off at a comparatively low cost. 16-mm prints suffer greater damage than theatre prints, because they are not always handled by trained projectionists, and the equipment on which they run is not always competently maintained. Distributors of 16-mm prints will benefit insofar as they are able to entrust their prints to professional projectionists who know how to take proper care of both film and equipment.

ELECTRICAL INSTRUMENTS

(*Continued from page 16*)

dicates rms value. Most widely used a-c type for commercial and industrial service. Can be used for d-c if forward and reversed readings are taken, though usually is not so used since less accurate and less sensitive than moving coil type.

PRINCIPLE: Fixed field coils carry measured current; moving iron vanes or plungers attached to pointer system are attracted in proportion to current in coils. No inherent damping, so needs supplementary air or magnetic damping.

COILS: Can handle much higher current than moving coil instrument. Takes more power to operate since there is no permanent magnet and coil must supply energy

Stereospectacle Loss 1/500

Stereoprojection showings at the Festival of Britain, for which the audience wore polaroid spectacles, resulted in "loss" of one pair of spectacles per each 500 spectators, Raymond Spottiswoode reports in the British *Journal of Photography*.

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for magnetic field. Therefore, less sensitive.

CURRENT: Up to 100A in panel type, 200A in portable and 600A in switchboard types. Up to only 60A if multi-range switch is required.

VOLTAGE: Up to 750V with internal series resistor.

SCALE: Badly compressed at low end or fairly well distributed, dependent on construction.

ACCURACY: Susceptible to errors from high frequency and poor wave form due to eddy currents and hysteresis in moving iron parts. Less accurate than permanent magnet—moving coil type instrument. ± 1% instruments are typical.

VARIANTS: ATTRACTION TYPE, SOLENOID AND PLUNGER: Short scale. Simplest form. Used on inexpensive instruments.

ATTRACTION TYPE, MOVABLE-VANE: Good scale distribution.

ATTRACTION TYPE, THOMSON INCLINED COIL: Long, well distributed scale, good accuracy.

REPULSION TYPE: Substantially uniform scale.

REPULSION-ATTRACTION TYPE: With curved, wedge-shaped vanes. Long (240°) scale.

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USE: DC or AC at frequencies up to 2,500 cps if compensated. Indicates rms. Used for wattmeters.

PRINCIPLE: Interaction of magnetic fields caused by currents in stationary coil and in movable coil.

COILS: Usually not rated more than 100 ma because of small, low torque lead-in spirals. Sensitivity less than permanent magnet—moving coil instruments, but better than moving iron types.

CURRENT: Coils connected in series, sometimes with a shunt across the moving coil only.

VOLTAGE: Coils connected in series, used with series resistor.

POWER: Stationary coil in series with line and movable coil, in series with resistor, across line. All wattmeters are electrodynamometer instruments.

SCALE: Compressed low end.

ACCURACY: Less subject to wave form and frequency error than moving iron types. ± 0.1 and 0.25% accuracy is attainable for laboratory standards.

STEREOSOUND ENHANCES TV

(*Continued from page 11*)

quality between the Altec 800 and Altec Voice of the Theatre speakers. An existing telephone line between the studio and theatre, previously used for intercom purposes, was tested for use as one of the three connecting lines but could not be equalized to match exactly the characteristics of the two new telephone lines, and therefore three entirely new lines had to be used.

Extensive tests and gain checks preceded the actual showing. All three channels had to be equalized in both volume and frequency characteristics, and similarly equalization of the triple mixer control and microphone circuits was essential.

Finally, switching was supplied on the amplifier rack to provide for conventional projection of sound pictures (via regular soundheads and the center amplifier channel and center 800 speaker system) so the Little Theatre could return, after demonstrating Eidophor, to its normal function as a review room for Twentieth Century-Fox pictures.

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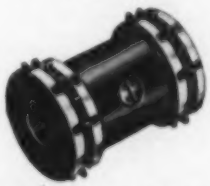

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HEART OF THE PROJECTOR MECHANISM

(Continued from page 8)

tent sprockets, especially on those older movements which have to be taken out of the mechanism for this operation.

Special care should be exercised not to deform the new sprocket (or the old one if it is to be reversed) or to spring, or bend, the star-wheel shaft on which the sprocket is placed. A slightly bent shaft or a lop-sided sprocket will cause a rapid jiggling of the picture (6 up-and-down movements per second). Patrons will certainly complain of this defect, even if the jiggling is too small in amplitude to be visible from the projection room without using opera glasses or binoculars.

Guard against dropping the movement or the star-wheel shaft and cover. *Do not* pound the pins from the old sprocket —use a pin-pusher. *Do not* pry the old sprocket from the star-wheel shaft with a screwdriver—use a sprocket-puller if the sprocket is stuck. Lacking a puller, soak the sprocket and shaft in a half-and-half mixture of gasoline and kerosene, and, wrapping the sprocket with a cloth, twist it off the shaft.

Do not file or sandpaper the shaft if the new sprocket goes on hard, and *never* pound the sprocket on with a hammer. Oil both the bore of the sprocket and the shaft, working the sprocket on with a twisting motion. And if at first you don't succeed, try, try again. You'll finally get it. To replace the pins, use a V-block held in a vise, and hammer the pins in *ever so gently!* Vigorous pounding may spring the shaft.

Elementary as the foregoing may seem to most projectionists, relief men often encounter positive evidence that some projectionist went at the job like a massive-muscled blacksmith. Speed should not be an object when replacing sprockets on the old-style intermittents —which means that every theatre should have a spare intermittent movement on hand.

The Future

And allow us to interpose our bewonderment at the fact that projector designers did not utilize a single-blade shutter revolving twice as fast as the double-blade shutter in order to obtain a more rapid and efficient light cutoff. It seems that even some of the most modern mechanisms reek faintly of the past.

What we *ought* to have, and *could* have, are *brighter* pictures, *bigger* pictures, *flicker-less* pictures. Why do we not have these things *now?* Illuminated screen surrounds are a pathetically weak substitute for bigger, eye-filling screens. Larger screens are impractical without more uniform picture illumination. Better light over larger screens is useless unless peripheral flicker caused by the 48 cycles per second occulting shutter can be done away with. This is where the 5:1 intermittent movement comes in and the sluggish 3:1 intermittent goes out. Is a more rapid intermittent so unimportant?

[THE END]

BRITISH PLAN COURSE

(Continued from page 14)

attention to the requirements of the Satutory Regulations made under the Cinematograph Act, current regulations of the Cinematograph Act, IEE Regulations for the Electrical Equipment of Building, and so on.

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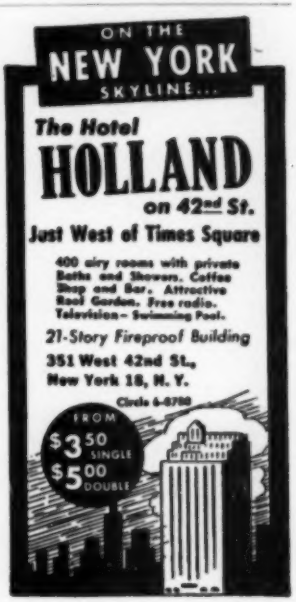

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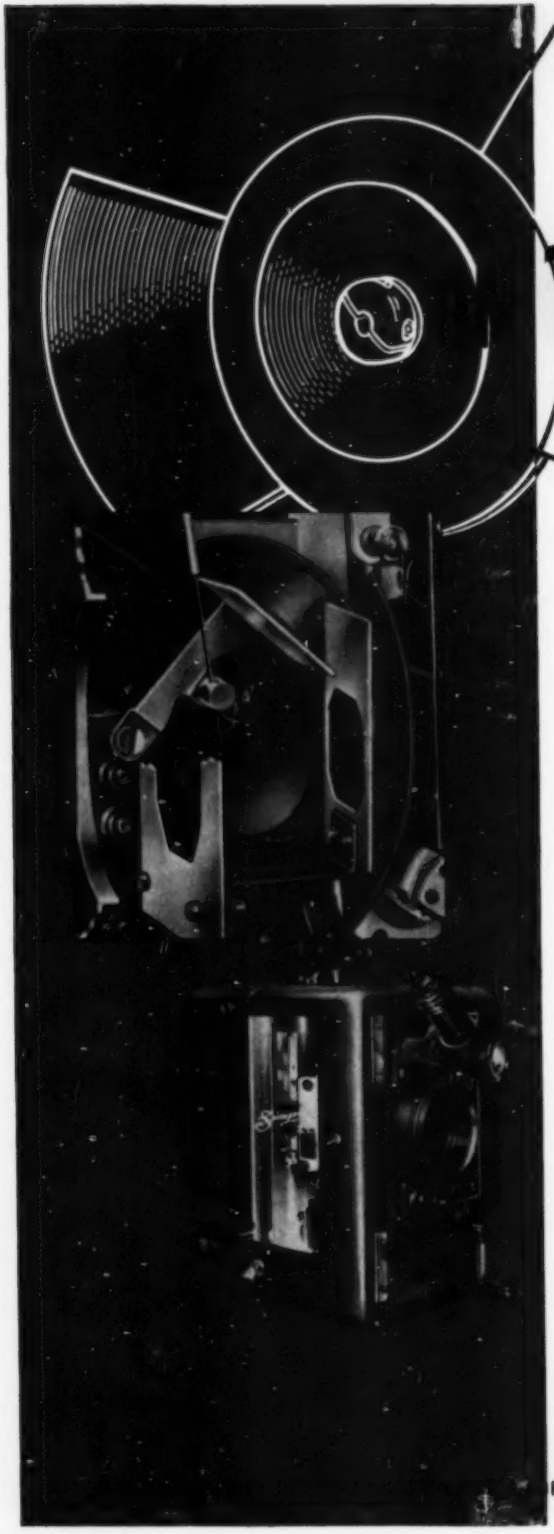

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